

AGRICULTURAL CHEMICALS



In This Issue:

WHAT THE DEALER MUST KNOW ABOUT INSECTICIDES • NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION'S FIRST MEETING
CHLORDANE-FERTILIZER MIXTURE FOR SOIL INSECT CONTROL • ENTOMOLOGIST PHOTOGRAPHS INSECTS • WEED CONTROL CHEMICALS
REPORT ON KYANIA INSECTICIDES • STORAGE PROBLEMS WITH L-40 AND FERTILIZER • INSECTICIDE TOXICITY DEVELOPMENTS

EXPERTS ARE TELLING FOOD PROCESSORS TO "AVOID POISONOUS INSECTICIDES"

FOR ABSOLUTE SAFETY...USE

NON-POISONOUS PYROCIDE DUST

HIGH IN KILLING POWER UNIFORM

● Government authorities have recently issued stiff warnings about insecticides used around food products. Milk has been found contaminated with dangerous quantities of toxic materials which have been traced to barn and cattle sprays. Some of the nation's largest food packers have now forbidden absolutely the use of poisons in connection with any produce which the company buys. All canners and food processors are aware of this situation.

Avoid all risk by standardizing on PYROCIDE DUST. This excellent, uniform MGK product, long America's standard pyrethrum dust, is very economical because it extends pyrethrins

4 to 5 times. It controls certain aphids, squash bugs, cabbage worms, cabbage loopers, cucumber beetles, leaf hoppers, Mexican bean beetles, and many other chewing and sucking insects.

If you are now using pyrethrum in any form, you will certainly want to know the whole story of PYROCIDE DUST, made only from MGK's stabilized, standardized Dry Pyrocide. Every formulator should have safe, non-injurious PYROCIDE DUST in his line to meet the demand.

The coupon below will bring you full information. Mail it *now!*

**MCLAUGHLIN GORMLEY
KING COMPANY**

MINNEAPOLIS, MINNESOTA

MAKERS OF INSECTICIDES

FOUNDED 1902

MCLAUGHLIN GORMLEY KING CO.

Minneapolis 14, Minnesota

● Send us information on *Pyrocide Dust*. We are interested in
Formulas Methods Prices

Name _____

Address _____

City _____

Zone _____

State _____



Quality and Service

You are assured on two important points — even in today's abnormal market — when you deal with P. C. A.

1. Quality . . . our Red Indian products are of unquestioned excellence.
2. Service . . . we make every effort to give you the service you want and deserve.

When better service is possible be assured P. C. A. will give it. Meanwhile, your confidence, and your patience are greatly appreciated.

POTASH COMPANY OF AMERICA

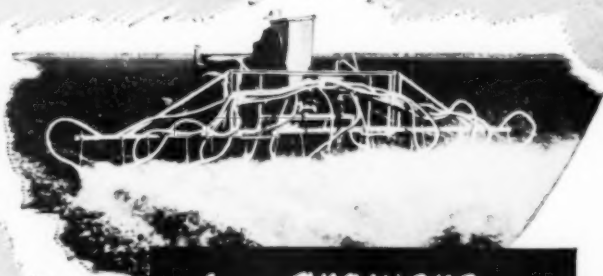
CARLSBAD, NEW MEXICO

GENERAL SALES OFFICE . . . 50 Broadway, New York, N. Y. • MIDWESTERN SALES OFFICE . . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . . Candler Building, Atlanta, Ga.

for *dust blenders...*



ATTACLAY'S multi-benefits help make multi-profits!



for *growers...*

By using Attaclay as extender or conditioner, finished dust blenders and their grower-customers both benefit.

Blenders are taking advantage of Attaclay's low bulk density to adjust the bulk of finished dusts. As a result, their whole line of crop dusts has a near-uniform volume. Packages and containers become standardized—mixing procedures streamlined. What's more, they are working with a highly adsorptive, free-flowing material that eases many blending steps.

Growers benefit, too. They don't have to constantly adjust their rigs or speeds to compensate

for "light" or "heavy" dusts. Besides, many growers know from experience how well Attaclay-mixed dusts will flow, disperse, settle, cover, stick and kill—how its lack of abrasiveness will lengthen rig life.

Look into our diluent for *your* finished dust formulations. All the good points that make Attaclay so popular with producers of 40% and 50% powders will work equally well to *your* profit. A generous, free sample is yours for the asking.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Philadelphia 5, Pa.

AGRICULTURAL CHEMICALS



THIS MONTH'S COVER

Spraying orchards for insect pest control is particularly important procedure at this time of the year. Here is a power sprayer in operation for early season control of orchard pests. (Photo through courtesy of Lowell Manufacturing Co., Chicago, Ill.)

MAY
VOL. IV

1949
No. 5

A Monthly Magazine For the Trade

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FOR YOUR INFORMATION



Making mortality counts on insects.

NIFOS-T DEADLY to wide variety of insects

Leaves no toxic residue

The past two seasons have demonstrated the usefulness of Nifos-T (Monsanto Tetraethyl Pyrophosphate) for controlling many pests that plague greenhouses, orchards and truck farms.

Here are some proved uses:

- ✓ Protection of greenhouse crops from aphids, mites, mealybugs and whitefly.
- ✓ Aphid control for canning and quick-freeze vegetable crops, such as peas, spinach, beans, cabbage and broccoli . . . Canners are recommending its use to their growers.
- ✓ Protection of shade and field-grown tobacco from aphid attack.
- ✓ Control of the periodical cicada (17-year locust) in young orchards.

Proved effectiveness—plus the fact that Nifos-T causes no problems of residual toxicity—is giving the product ever-expanding applications involving agricultural and horticultural pests.

SEND FOR LITERATURE

For more complete information ask for copies of Monsanto Technical Bulletin No. O-46, "Nifos-T," and a recent Monsanto study, "Determination of Tetraethyl Pyrophosphate in Mixtures of Ethyl Phosphate."

PROGRESS REPORT ON NIRAN

Monsanto's Parathion effective against greenhouse pests

Recent Government and University research has shown that Parathion (Monsanto's Niran®) gives excellent control of insect pests that attack greenhouse ornamentals.

Monsanto is producing limited amounts of Niran in 1949 for formulation by insecticide manufacturers.



FOR CONTROL OF WOODY WEEDS

2,4,5-T Acid
2,4,5-T Isopropyl Ester

Field experiments indicate that formulations of 2,4,5-T are highly effective in controlling woody weeds that are resistant to other herbicides.

Monsanto 2,4,5-T Acid and 2,4,5-T Isopropyl Ester are now available in moderate quantities . . . Inquiries are invited concerning properties and applications.

DILUENT FOR DDT

Latest data on SANTOCEL C

A recent bulletin of the U. S. Department of Agriculture, "Storage Tests on Conditioned and Wettable Powders Containing 90 Percent of DDT," is now available in reprint form from Monsanto.

The publication contains useful data on silica aerogel (Monsanto's Santocel® C) as a diluent for DDT formulations . . . Address requests for copies to MONSANTO CHEMICAL COMPANY, Merrimac Division, Boston 49, Mass.



1,500 SPECIES OF MOSQUITOES

Santobane an effective weapon

There are about 1,500 known species of mosquitoes in the world. However, their ranks are being depleted through intensive application of Santobane (Monsanto DDT) formulations.

In addition to its wide domestic use, Santobane is employed to combat malaria-carrying mosquitoes in tropical regions throughout the world.

EMULSIFIER FOR 2,4-D

Sterox SK recommended for use with 2,4-D Isopropyl Ester

Polyoxyethylene Thioether is efficient over wide ranges of pH and heat

Formulators of herbicides will find in Sterox® SK an excellent emulsifying agent for 2,4-D Isopropyl Ester. A product of Monsanto's Phosphate Division, Sterox SK is a clear, amber-colored polyoxyethylene thioether which contains no alkali. It is stable over a wide range of pH and heat—is equally efficient in solutions that are hot or cold, hard or soft, acid or alkaline.

Only small concentrations needed

Sterox SK is supplied in highly concentrated form, with the result that only about a 4% concentration is needed with 2,4-D Isopropyl Ester. This advantage, along with favorable prices, makes Sterox SK most economical to use.

Further details may be obtained by writing MONSANTO CHEMICAL COMPANY, Phosphate Division, or by noting your request on the coupon.

News of Monsanto Chemicals for Agriculture... May, 1949

SANTOBANE NOW AVAILABLE IN THREE FORMS

Monsanto Santobane* is now furnished in three forms, all made to the highest standards of effectiveness and uniformity:

SANTOBANE

A high-quality, fine granular powder. Readily solubilized, emulsified or milled.

SANTOBANE 50

A straight dust concentrate containing excellent inert. Free-flowing for air or ground dusting.

SANTOBANE 50W

An improved wettable form of Santobane 50. Contains a superior wetting agent permitting its addition direct to water to form a non-foaming fine suspension.

Send for 28-page Santobane book



Complete information on Santobane is contained in a 28-page illustrated book, "SANTOBANE, Monsanto DDT." Send for your copy.



ORTHODICHLOROBENZENE

widely used for
forest insect control

Effective against mountain
pine beetle

Last summer 110,000 trees on one million acres of western forest land were threatened with an epidemic attack of the mountain pine beetle. As a countermeasure, standing trees were sprayed with a mixture of orthodichlorobenzene in fuel oil, to penetrate the bark and kill mature beetles before emergence. Five hundred men participated in the campaign, which lasted from May 1 until the latter part of July.

Further information on orthodichlorobenzene and its many important applications will be sent promptly on request.

Now available in five-gallon containers

As a service to small-volume consumers, Monsanto is now packaging orthodichlorobenzene in quantities as small as five gallons.



2,4-D helps cut small grain losses due to stem rust disease

Useful in eradicating
rust-susceptible barberries

"The stem rust disease of wheat, oats, barley and rye is one of the most destructive of all the fungus diseases that attack small grains. Every year it reduces the yield and quality of these crops in some areas. In epidemic years it has caused losses in the United States of more than 180,000,000 bushels of grain."*

Monsanto 2,4-D Acid will help reduce these losses when properly used to destroy rust-susceptible barberries. It is recommended that barberry canes be cut off at the crown and that these freshly cut surfaces be treated with small amounts of 2,4-D in concentrated form. As a safety precaution, only experienced persons should use this method.

The destruction of barberry bushes eliminates early-spring sources of stem rust inoculum and eradicates the plants on which races of the fungus breed. There are many species and varieties of barberries. Most of them are susceptible to stem rust, but a few are immune or highly resistant. In addition to properly applying 2,4-D, farmers should use approved rust-resistant varieties of grain — follow

cultural practices recommended by state experiment stations.

Monsanto furnishes 2,4-D in these three forms:

2,4-D Acid (99% minimum assay)

2,4-D Sodium Salt (minimum 82% equivalent 2,4-D acid)

2,4-D Isopropyl Ester (99% minimum assay)

Inquiries concerning technical data, prices and availability will be given prompt attention.

*Quoted from "Stem Rust," Picture Sheet No. 23, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. Copies available at five cents each from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

WATCH THE WIND

When burning 2,4-D containers

We have recommended from time to time careful disposal of 2,4-D containers to avoid accidental contamination. . . Paper, fibre or wood containers should be burned so that they cannot be used for other products. If containers are burned, however, care must be taken that wind drift of volatilized 2,4-D is not permitted to contact growing crops.

*Reg. U. S. Pat. Off.

☆☆☆

MONSANTO CHEMICAL COMPANY,
Desk C, Organic Chemicals Division, 1766
South Second Street, St. Louis 4, Missouri.
District Sales Offices: Birmingham, Boston,
Charlotte, Chicago, Cincinnati, Cleveland,
Detroit, Houston, Los Angeles, New York,
Philadelphia, Portland, Ore., San Francisco,
Seattle. In Canada, Monsanto (Canada) Ltd.,
Montreal.



SERVING INDUSTRY...WHICH SERVES MANKIND

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Desk C, Organic Chemicals Division
1766 South Second Street
St. Louis 4, Missouri

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Name _____ Title _____
Company _____
Type of Business _____
Address _____
City _____ State _____

New ! Revolutionary !

PENCO **PENCAL**

SPECIAL CALCIUM ARSENATE

for mixers—jobbers—growers

NOW—A SPECIAL CALCIUM ARSENATE THAT CAN BE SUCCESSFULLY COMBINED WITH
ORGANIC INSECTICIDES FOR THE CONTROL OF VIRTUALLY ALL COTTON PESTS!

- ★ COMPATIBLE WITH BHC—DDT—PARATHION
- ★ TIME SAVING—COST SAVING
- ★ PROVEN IN THE FIELD
- ★ AT REGULAR CALCIUM ARSENATE PRICE
- ★ AVAILABLE FOR THIS SEASON'S NEEDS

Made in the South—for the South

PENCAL*, Pennsalt's newest addition to the Penco line of superior agricultural chemicals, is a special calcium arsenate which is designed to be compatible with such organic insecticides as benzene hexachloride, DDT and parathion.

PENCAL in combination gives an effective insecticide for the control of boll weevil, leafworm, bollworm, aphids, flea-hoppers, spiders, and certain other cotton pests giving the farmer a composite and economical cotton insect program.

And . . . PENCAL alone can be used for effective control of boll weevil, leafworm and bollworm.

PENCAL in combination eliminates the necessity of separate applications of aphicides or miticides . . . saves time . . . reduces costs.

Before you buy calcium arsenate or any cotton insecticides, investigate PENCAL . . . find out for yourself how this new Pennsalt product can help you get a bigger, better cotton crop . . . at lower cost this year. Write, phone, or wire: Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa. • Bryan, Texas • Tacoma, Washington.

*PENCAL MADE IN U.S.A.



Other PENCO Cotton Insecticides
Include:

BHC Compounds
DDT Compounds
Penphos (Parathion)
Penco Toxaphene

CHAMPION Double-Action means FASTER DUSTING Saves Time • Labor • Powder

NOW you can get *more* and *better* dusting done in less time with the Champion Double-Action Duster. Its modern, advanced design means a *continuous* flow of powder whenever the lever is operated.

You dust, grind and mix powder with each up-stroke and with each down-stroke. With no interruption in the flow of powder, Champion's double action saves you time, labor and powder.

The Champion fits comfortably on the operator's back. Its easily operated bellows can throw a screen of dust exactly where wanted within a range of 30 feet. No heavy or bulky mechanisms are involved . . . no gears to get out of order and become hard to operate. Note the many features.



Only CHAMPION Gives You These CHAMPION Features

KIDNEY-SHAPED SHIELD fits the operator's back comfortably and is held in place by adjustable straps.

FILL OPENING is 10 inches in diameter . . . simplifies filling and cleaning hopper.

HOPPER of extra large size holds up to 17 pounds of fluffy powder.

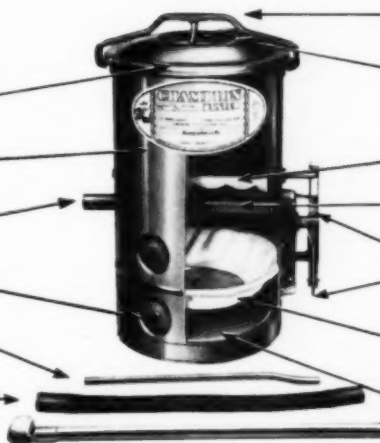
OUTLET pipe for attaching hose and discharge pipe.

LOWER INTAKE VALVE may be removed for Spot Dusting.

OPERATING LEVER is of convenient length for easy operation. Moving it up and down requires less effort than turning a crank.

30" FLEXIBLE rubber hose.

24" DISCHARGE PIPE—lead coated.



CONVENIENT HANDLE serves as locking device for top cover and is handy for carrying or lifting duster.

TOP COVER is easily removed by bringing the cover-locking rod to vertical position. This releases pressure on the cover.

AGITATOR mixes and grinds powder whenever lever is operated.

REGISTER makes it easy to control density of dust flow.

CONTROL LEVER, for controlling density of dust flow, is conveniently located. Adjustment is made by pushing or pulling lever, which sets the register.

BELLOWS are of durable quality leather and are protected by being enclosed within the body of the duster.

DUSTER BOTTOM can be easily removed by taking out three screws to service or remove the bellows.

EASY TO FILL • EASY TO CLEAN

Big, 10-inch hopper cover makes the new Champion easy to fill and clean. Duster weighs 14 lbs. empty; holds up to 17 lbs. of fluffy powder.



Jobber and dealer territories open. Write for details.

CHAMPION SPRAYER CO. 6541A Heintz Ave. DETROIT 11, MICH.

Manufacturers of Portable Sprayers and Dusters

The Champion Line for '49



No. 1
Knap sack
Sprayer



No. 102
Knap sack
Spot Duster



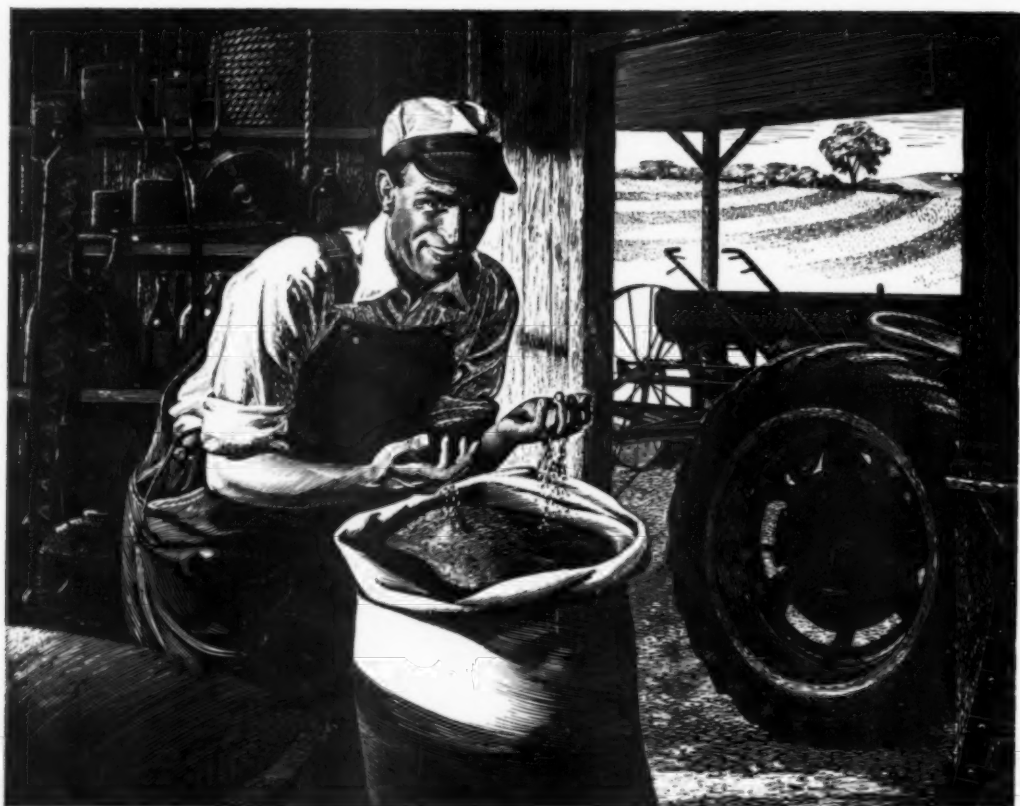
No. 103
Hand
Duster



No. 204
Slide Sprayer
with Tank



No. 202
Utility Slide
Sprayer



Why Farm Mechanization Increases Need for Magnesium in Mixed Fertilizers

Sul-Po-Mag

Water-Soluble

Double Sulfate of Potash-Magnesia

Magnesium deficiencies in the soil, appearing in unexpected places, may in some cases be the result of farm mechanization.

The reduction in the number of draft animals on the farm, in some fertilizer-using states, has resulted in a decreasing tonnage of magnesia returned to the soil in

manure. Increasing evidence of magnesium deficiency in the soil in many parts of the country, whatever the reason may be, is stimulating the demand for fertilizers containing soluble magnesium.

Many farmers are finding that the most practical and economical way to get magnesium is in combination with potash. *Sul-Po-Mag*, mined and refined exclusively by International at Carlsbad, New Mexico, supplies both potash and magnesium in a natural combination. Both the potash and magnesium are in water-soluble form and are quickly available to crops.

By using *Sul-Po-Mag* in your fertilizers, you can help farmers to overcome magnesium deficiencies in their soils and increase the quality and yields of their crops.

SUL-PO-MAG (Water Soluble Double Sulfate of Potash-Magnesia) • MURIATE OF POTASH • SULFATE OF POTASH

Potash Division • International Minerals & Chemical Corporation

General Offices: 20 North Wacker Drive, Chicago 6



AGRICULTURAL CHEMICALS



Introducing Your Union Multiwall Specialist

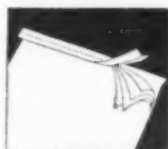
(His job is to make your packaging dollar go further)

YOUR UNION Multiwall Specialist knows how to tailor a package to meet the specific needs of your product and method of distribution. He has helped many firms reduce their packaging costs. He may be able to do the same for you.

Union Multiwall Bags are used in plants making more than 300 different commodities. They're speeding up packaging, cutting labor and shipping costs, giving added protection to the product—yes, and making customers happier.

Even if you're now using Multiwall Bags the Union Multiwall representative who calls on you can give you new ideas on packaging methods that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulp-to-bag plant in the world, and skilled engineering and design experts.

Let him show you how Union resources and packaging experience can help you.



Multiple Protection



Opens Easily



Prevents Siftage



Empties Clean



UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK



A CAREFUL diagnosis would probably reveal a lack of uniformity in your insecticide product—caused by inefficient or outmoded equipment . . . unsuited to the specialized job of producing a lump-free blend of high uniformity.

In over 30 states, satisfied users of Sprout-Waldron Intimate Blending Systems keep their customers happy. They have found the cure for SPATULITIS through low-cost, quality production.

As so successfully demonstrated in widely diversified installations, a Sprout-Waldron System is adaptable to the most rigid requirements of every dust producer.

When you buy Sprout-Waldron, you get a complete system engineered and specified in every detail by experienced men for

greater production and a top quality product. The extras are: high efficiency . . . low operating costs . . . a safe, dust-free plant.

We believe that you realize the importance of planning now for your Intimate Blending System. Accordingly we are prepared to make specific recommendations to meet your individual installation requirements anytime at your convenience. Consult Sprout-Waldron and Company, 7 Waldron St., Muncy, Pennsylvania.



Available Now!

Fumigants and Insecticides of Tested Reliability For Your Requirements



Dow fumigants and insecticides are backed by many years of research and testing in Dow Laboratories, plus wide use in every field of pest control.

DOWFUME 75

(Ethylene Dichloride 75% and Carbon Tetrachloride 25% by volume)

An all-purpose grain and spot fumigant mixture.

DOWFUME EB-5

(Ethylene Dibromide 5% by volume)

For use in farm or large elevator bins . . . penetrates all levels of the bin . . . controls pests in surface layers of grain.

DOWFUME EB-15

(Ethylene Dibromide 15% by volume)

For local mill machinery and spot fumigations.

DOWKLOR FORMULATIONS

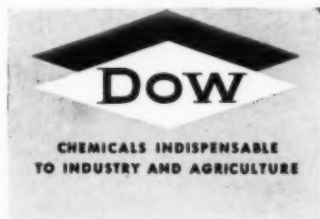
Combine contact, fumigant and stomach poison action to most crawling insects. Three formulations: DOWKLOR-5%-Dust, DOWKLOR-40%-Emulsifiable and DOWKLOR-40%-Wettable.

Your inquiries are invited.

FUMIGANT DIVISION

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada



SAFETY!

IS IT IMPORTANT TO YOU?



GROWERS: Your suppliers can easily supply you with effective dusts which won't involve you in controversial arguments about toxic residues. They need only use U.S.I.'s new **CPR Dust Base**. CPR contains pyrethrum and rotenone. And the equally safe piperonyl cyclonene has been included to provide an extra measure of effectiveness.

Dusts based on CPR control a wider variety of truck crop insects with effectiveness, economy and maximum safety.

MANUFACTURERS: CPR Dust Base is carefully standardized to insure uniform active ingredients in your finished dusts. And its physical properties permit easy blending with diluents.

Ask the nearest USI office for a copy of the new CPR Dust Base booklet. It includes detailed information on formulations of finished dusts, labeling and suggestions for use.

The logo for U.S. Industrial Chemicals, Inc. It consists of the letters "U.S.I." in a bold, sans-serif font, enclosed within a square border.

INDUSTRIAL CHEMICALS, INC.

60 East 42nd Street, New York 17, N. Y.

Branches in all principal cities

In Canada: Standard Chemical Co., Ltd., 99 Vanderhoof Avenue, Leaside, Toronto 17, Ont.

Basic Chemicals for Agriculture

DDT

100% technical grade

Emulsifiable solutions

Wettable dust

2,4-D

Acid and Sodium Salt

Tech. Isopropyl Ester

Tech. Butyl Ester

Tech. Methyl Ester

44% Isopropyl Ester Solution

40% Butyl Ester Solution

40% Triethanolamine Salt Solution

Kolker Chemical Works Inc.

Manufacturers of Organic Chemicals

80 LISTER AVENUE • NEWARK 5, N. J.

Now, chemical weed control is practical everywhere!



Pittsburgh Agricultural Chemicals

2,4-D Acid
2,4-D Amine Concentrates
2,4-D Sodium Salt Monohydrate
2,4-D Ester Formulated Concentrates
2,4,5-T Ester Formulated Concentrates
Phenolate-O
Phenolate-S
DNOC—Technical
Parathion—Technical
15% Parathion Wettable Dust Concentrate
25% Parathion Dust Concentrate
Alpha Naphthylthiourea (ANTU)
Iminol—A
Iminol-D
Quaternary Ammonium Compounds



PITTSBURGH

**2, 4-D Stabilized with IMINOL-D
solves hard water problems and
increases spray effectiveness.**

In many agricultural areas the control of weeds by 2,4-D amine sprays has not been practical because of undesirable precipitates resulting from *hard* water dilution.

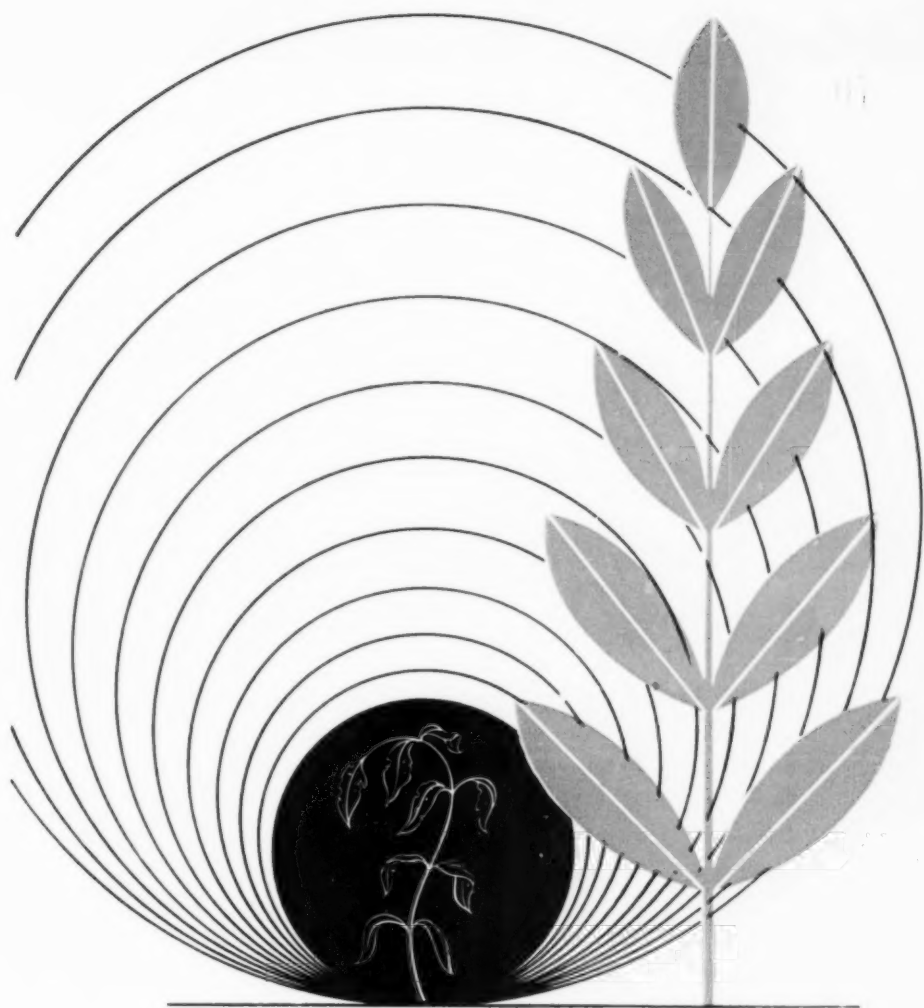
Now, the full benefits of 2,4-D sprays are available everywhere when *Pittsburgh* 2,4-D amine solutions are used . . . because to every gallon of *Pittsburgh* 2,4-D there has been added a carefully controlled quantity of *Pittsburgh* Iminol-D. This addition not only increases the effectiveness of the solution but also prevents plugging and clogging of spray equipment.

Write today for your free copy of 2,4-D Bulletin No. 301 and Iminol-D Bulletin containing water data map of U. S. Address:

PITTSBURGH AGRICULTURAL CHEMICAL CO.
6505-A Empire State Building • 350 Fifth Ave. • New York 1, N. Y.

Affiliated with
PITTSBURGH COKE & CHEMICAL COMPANY
Grant Building • Pittsburgh 19, Pa.

AGRICULTURAL CHEMICALS



bigger crops, bigger profits with

toxaphene

agricultural insecticides



Toxaphene (chlorinated camphene, 67-69% Cl.) is recommended by leading cotton growing states for control of boll weevils and other cotton insects. It is recommended by USDA for grasshopper control. Are you prepared to meet resulting demands for toxaphene dusts and sprays in these markets and in others as they develop? Write for 16-page book, "Facts About Toxaphene Insecticides."

HERCULES POWDER COMPANY, 970 Market St., Wilmington 99, Del.

NOV-10

MAY, 1949

for better control of more insects,
insecticides containing

Thiophos
REG. U. S. PAT. OFF.
PARATHION

developed by American Cyanamid Company

Because THIOPHOS controls destructive insects on practically every major crop, the demand will be heavy. The companies whose trade names appear below will supply Dust Concentrates for making Dilute Dusts and Wettable Powders. Select one of these reliable manufacturers and arrange now for your supply of THIOPHOS Insecticides.



PARATHION
Geigy Company Inc.
New York, N. Y.

LETHALAIR

G-54
PARATHION
AEROSOL
Virginia
Smelting Company
West Norfolk, Va.

CHIPMAN
PARATHION

Chipman Chemical Co., Inc.
Sound Brook, N. J.

P.A.R.
PARATHION

Sutland Industries, Inc.
Fresno, Calif.

Phos Kil
PARATHION

Niagara Chemical Division
Food Machinery Corporation
Middleport, N. Y.

PARADUST
PARATHION

Blattler Chemical Company
San Francisco, Calif.
New York, N. Y.

DOW
PARATHION

The Dow Chemical Company
Midland, Michigan

VAPOPHOS
PARATHION

California Spray-
Chemical Corporation
Richmond, Calif.

PENPHOS
PARATHION

Pennsylvania Salt
Manufacturing Company
Philadelphia, Pa.

APHAMITE
PARATHION

The Sherwin-Williams Company
Cleveland 1, Ohio

PARATHION
INSECTICIDES

Tobacco By-Products
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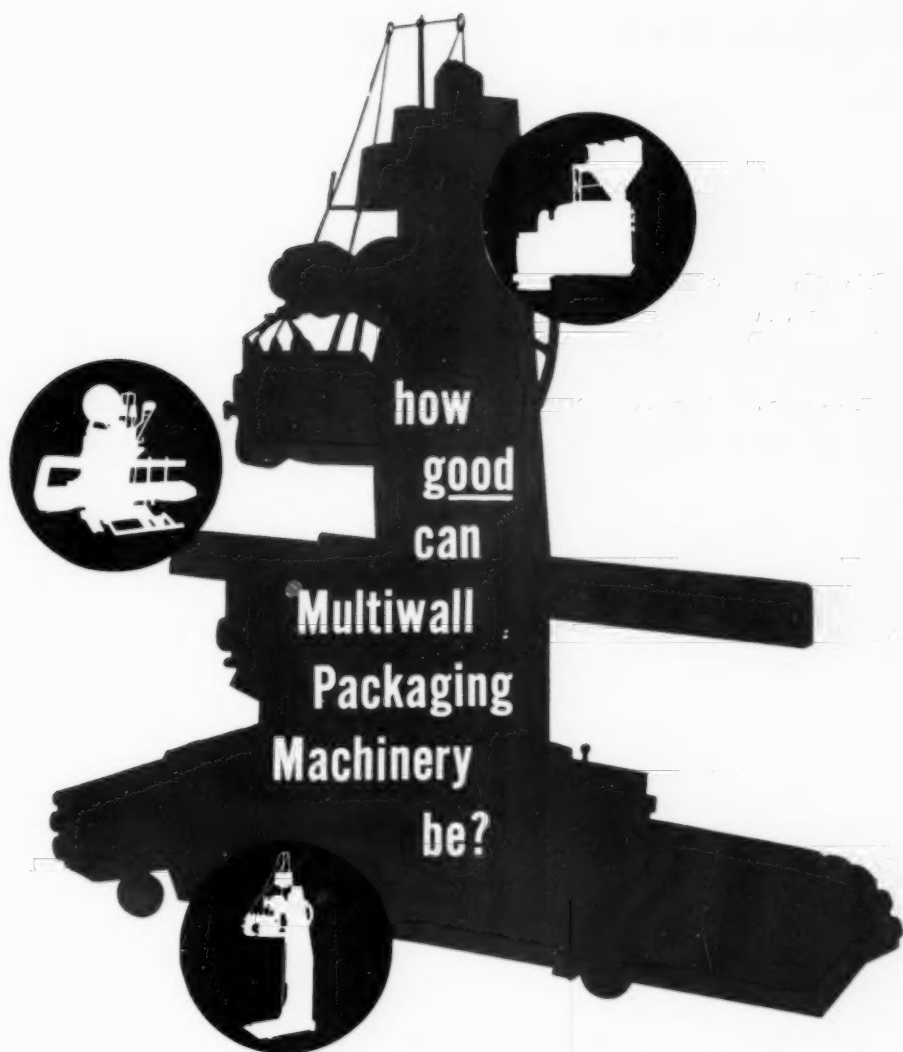


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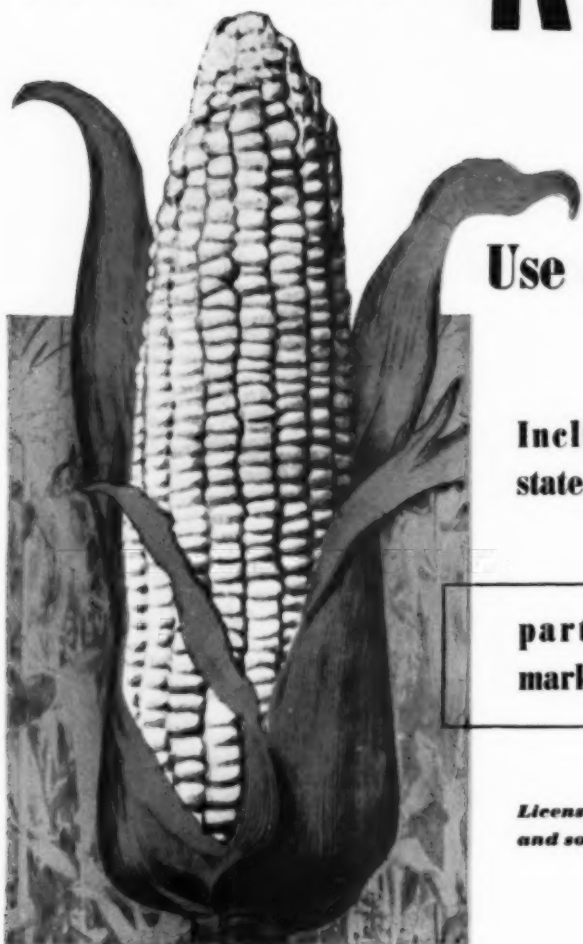
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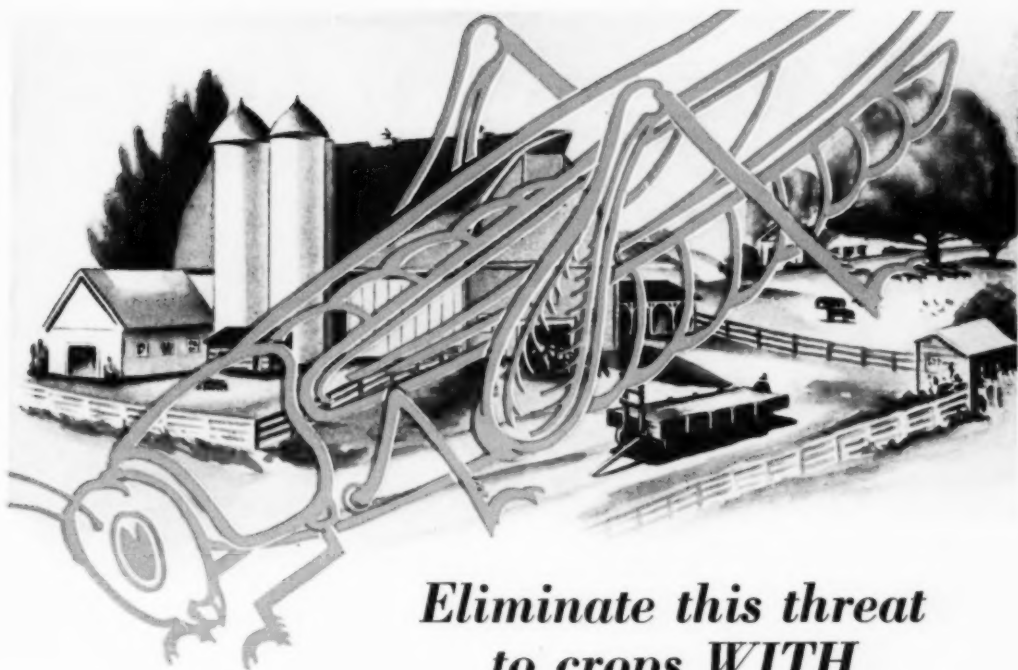
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THE EDITOR COMMENTS

A NON-CHEMICAL weed killer is reported to be gnawing away at Klamath weed infestations on the western ranges of the U. S. On the offensive is the insect *Chrysolina*, popularly known as the Klamath weed beetle, which devours the weed ravenously. The beetle does not bother any other plant, it is reported.

Some months ago Federal entomologists imported some of these beetles from Australia and experimented in laboratories, to check the bug's appetite for Klamath. Colonies of the insect were then "planted" in a number of western states where it is reported that they are multiplying and chewing at a rapid rate.

Populations of the beetle will have surpassed the tens of millions point in a couple of years, entomologists predict, and these, plus the offspring from the later hordes, should wipe out Klamath weeds completely in that area.

One can't help wondering, however, what will happen to the tremendous populations of beetles when and if their one source of food is eaten up. If, as is predicted, the Klamath weed will be a thing of the past in the west, will the beetles accept the verdict that their earthly work is done, cease multiplying, and persist in their refusal to eat other plants? This seems hardly possible, judging from the records of similar instances of the past.

The objection that chemical herbicides are too expensive for control of Klamath could backfire some day . . . and the beetle area may have a neat problem on its hands with a widespread infestation of bugs which might put to shame the depredations of the weed which they came to conquer. Somehow, there are too many unanswered ques-

tions about using insects to kill weeds. We'd much rather see a foolproof remedy worked out through the discreet use of chemicals.

FOR the first time under its new name, the National Agricultural Chemicals Association, formerly the A.I.F.A., is holding its annual meeting at Rye, New York, this month. With a considerably expanded scope of operation, the newly-formed group has taken on added responsibilities by including in its membership many groups who under the former setup did not qualify as members. It seems very logical that an industry meeting should be attended by custom operators, equipment manufacturers, suppliers and dealers. All of these have a definite stake in the field and each possesses specific knowledge which when pooled with that of others, comprises the "know how," which aids in the solution of mutual problems.

And problems there are in abundance. Custom sprayers are interested in knowing the assets and liabilities of new toxicants; equipment makers want to know how they can produce applicators to do the best job; manufacturers of insecticides, fungicides and herbicides want to hear the latest recommendations and reports on how their products are being received. The dealer, obviously, needs to become better acquainted with the entire pesticide picture.

It is no exaggeration to say that the eyes of the entire pesticide industry are on this meeting. Many of the reports coming out of it will have a distinct bearing on future plans for manufacturing, application, and general use of various types of toxicants. The NAC Association is getting off to a

good start, and here's wishing it well! Its expanded membership and broadened scope should be a good omen for the future of agricultural pest control.

ON the profit side of the ledger, DDT has long since lost its attractiveness for manufacturers of the basic chemical. Rapidly, 2,4-D, benzene hexachloride and others are moving into the same class. Prices have become too low to show a margin of profit adequate to justify a continuation of manufacturing operations in most plants. Producers continue turning out these chemicals because they have the equipment in operation, and either find it cheaper to run than shut down or hope for an early upturn in prices. Some have already quit manufacturing operations, but this has not seemed to make any great difference in the market. It continues weak and the remaining producers are not making money.

Offhand, this general situation might be looked upon as extremely favorable to the average compounder of agricultural chemical specialties of one sort or another who buys his basic chemicals. What could be finer than low prices, — sometimes below cost, — and ample supply? But, there is another side to the picture, a side which has been shown many, many times down through the years. That is the assurance that when enough manufacturers quit producing, — and demand suddenly expands, the situation must inevitably reverse itself and compounders, dealers, and growers alike will be forced to pay through the nose.

If the present generally upset and chaotic condition of the market for basic agricultural chemicals does not change soon, others are bound to pick up their marbles and quit. This is inevitable. And we would hate to see it because we know from long experience what it can and will mean marketwise all down the line to the grower. But what manufacturer will carry on indefinitely producing any item without a decent profit?

THAT there is a steadily growing demand for fertilizer materials in the Pacific southwest is emphasized in a recent newsletter sent out by the California Fertilizer Association of Los Angeles. As a contribution toward continuance of the upward trend in sales, the Association gives its members some good advice which merits wider attention throughout the industry. It points out the importance to farm communities of services rendered by the fertilizer manufacturer and dealer to insure the farmer's getting maximum benefit from the fertilizer materials he buys. "The fertilizer industry is vitally interested in assuring maximum returns to the farmer for his fertilizer dollar," the CFA notes.

Fertilizer sales in California are increasing steadily, and the Association naturally wishes to keep the curve pointing upward. Approximately fifty million dollars are spent annually by California farmers for fertilizer and agricultural minerals. As we have said before in this column, the rise of fertilizer consumption in sections where use has been low heretofore, is bound to go far in offsetting a decline in purchases when and if government support prices drop and the grower has less money to spend.

From here, it looks like the fertilizer industry the country over has done a first rate selling job. The harvest from this earlier effort is bound to come sooner or later.

SO FAR, no new developments have come to light in the insecticide vacuum produced by a quick succession of rumors, newspaper articles, statements by government agencies on labeling, and comments by individual companies. At least one significant note is added, however, and that is in a recent advertisement describing a new insecticide mixture where one line reads: "Contains no DDT." Not long ago, manufacturers were out-doing each other to put DDT in bigger letters to attract buyers. Never underestimate the power of publicity, for good or ill!

The dealer in farm chemicals must have correct answers for a wide variety of questions involving specificity, residues, toxicity to man and animals and application methods. Many of these are discussed in Dr. D. E. H. Frear's article covering:

by

Dr. Donald E. H. Frear

Prof. of Agricultural and Biological Chemistry
Pennsylvania State College,
State College, Pa.

What the Dealer Should Know About

INSECTICIDES

THE insecticide dealer of only a few years ago could operate successfully with an extremely narrow range of materials on his shelves. These few toxicants constituted most of the known and accepted materials in use for insect control at the time. Because the growers who employed these insecticides normally knew as much about their use as did the dealer, the questions asked by the purchaser were likely to cover only the price rather than how to apply the materials.

Contrast that easy-going era with the complicated situation in the insecticide field today! Although everyone is aware that progress has been made in the development of new insecticidal preparations during the past few years, no person should be more acutely acquainted with its significance than the dealer. He is on the front line of action. It is he who is expected to know all of the answers . . . to be informed on the latest preparations and their specific uses; to be stocked with plenty of the correct material for any and all insect infestations in

his trade area; and at the same time to attempt to avoid stocking duplicate materials under different and sometimes confusing trade names.

Most of the dozens of newer insecticides which the dealer is expected to know intimately are specifics for certain pests and more or less ineffectual against others. They are not the "shot-gun" type which characterized the older products. In addition to their being specific to insects, the dealer must not forget the possible effect of the insecticide on the fruit, vegetable, cereal or other crop on which it is to be applied.

The problem of toxic residues has lately claimed the attention of many growers, and the dealer, of course, must know about this too.

Other considerations include the method of application . . . whether the material is to be sprayed, dusted, fogged, applied with a mist blower, or applied by airplane. Difficult complications are bound to arise with so many matters to consider.

To add to the burden, the public has become much more conscious of pest control, and is aware that many new products have been developed of late. The introduction of DDT, for instance, was attended with wide publicity, much of which was inaccurate and exaggerated, but it served to make the term DDT well-known everywhere. In contrast, how many customers, even today, know that pyrethrum is an insecticide? Yet, this material was used as an insecticide long before the insecticidal properties of DDT were known.

The general effect has helped to alter the attitude of the public concerning pest control to the extent that growers now say, "Let's get something to control those bugs," rather than "Aren't the bugs awful this summer?"

The problem of the dealer who is faced with his customers' questions is both real and acute. Not only are there fairly large numbers of good insecticidal materials, each having a somewhat specific use, but there are dozens of brands of each material on the

market. These names, designed to catch the customer's eye and insure repeat buying, range from the sensible to the ridiculous. The customer may remember to buy "Super Bugoo X 147," but the name certainly does not give him or the dealer much information. The confusion of trade names has actually resulted in the customer being told that a particular insecticide was not in stock, while at the same time it might be masquerading on the shelf under a high-sounding but meaningless name.

Know the Maker

THE first suggestion to the dealer, concerns the choosing of manufacturers. Goods should be bought from a reliable source. This does not necessarily mean the larger manufacturers: many small companies are thoroughly reliable, and frequently can render better local service. Avoid handling products with meaningless names on flashy labels. The basic insecticide materials are pretty much the same, and a good manufacturer is not ashamed to label his product with its correct name, along with his own brand name. Labels designating a "Cucumber Dust" or "Rose Dust" etc. are acceptable, because they are informative. With such labels, the customer has a reasonable assurance that the "Cucumber Dust" will protect his cucumbers from insect injury, and that is really all he cares about. Such specific labels simplify the dealer's problems, and their use should be encouraged.

When it comes to considering insecticides not specifically compounded for certain types of plants, the dealer should have a certain amount of general information at his command. The dealer is usually neither a chemist nor an entomologist, so the following information will necessarily be brief and in as non-technical language as possible.

Insects Classified

INSECTS may be divided into two general classes for the purposes of this discussion: (A) Those which may be poisoned through their food, and (B) Those which cannot. The insects in class A are in general the chewing insects which attack crops. They include such familiar examples as the Colorado potato beetle, the Mexican bean beetle, and the Japanese beetle. These may usually be controlled by applying the insecticide to the leaf surfaces of the plants on which they feed, and such materials are frequently termed stomach poisons. In general, the inorganic materials most commonly used are *lead arsenate*, *magnesium arsenate*, *calcium arsenate*, *Paris green* and *cryolite*. Since these leave poisonous residues, however, their use on vegetable crops should not be encouraged, and in fact most of the insects in this class can be controlled with relatively non-toxic materials.

In class (B) are the insects which cannot be controlled by poisoning their food. This includes a very large number of different insect species, and it is obviously impossible to list all of them. For this reason, it will be easier to consider their control by discussing the materials which are used for their control.

Insecticides from Plants

THIS group includes two of our safest insecticides, pyrethrum and rotenone, and the latter in particular should be recommended for many uses of insects common in the home vegetable garden for this reason. **Rotenone** is derived from the roots of certain tropical plants, and may be designated as derris or cubé. It is usually applied as a dust, the rotenone content of the dust being adjusted to between 0.75% and 1%. Some preparations may also be used as sprays to advantage. Rotenone is relatively harmless to warm-blooded animals, and hence is

quite safe to use on edible crops such as beans, etc. It is also used as a constituent of louse powders for livestock.

Pyrethrum is also relatively harmless to higher animals, and may be used on crops, although it is not so widely used for this purpose as rotenone. Pyrethrum is a plant product, and the natural material consists of the dried flowers of a species of chrysanthemum. The largest use for pyrethrum is in household insect sprays. These liquid, oil-base sprays are excellent for ridding any enclosed space, such as a room, a barn, etc. of flies, mosquitoes and other insects. They do not have any appreciable residual action (see DDT) as commonly used, and only the insects which come in contact with the spray are killed. These are termed "space sprays."

Nicotine is a very poisonous alkaloid obtained from the tobacco plant. It is one of the most useful insecticides for controlling aphids or "plant lice," and is used for this purpose at very low concentrations. Concentrated nicotine solutions are highly poisonous to all animals, and should be treated as a dangerous poison.

Other plant insecticides have been used from time to time. **Ryania** is recommended for the European corn borer and certain other insects, while **sabadilla** is suggested for several agricultural insects, including leaf hoppers, grasshoppers and the gypsy moth.* **Hellebore** has been recommended for the control of insects attacking small fruits, particularly currants, but is seldom used at present.

Synthetic Organics

IT IS this group of insecticides which has grown by leaps and bounds within the past few years. In this class fall most of the products which have been so highly publicized recently, and on these the dealer will probably have the most questions. Some of these

*An excellent article on *sabadilla* appeared in *AGRICULTURAL CHEMICALS* for August, 1946.

have been adequately tested, and recommendations can be made with some certainty. Others are still in the experimental stages, and our knowledge is far from complete.

DDT (2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane, or less correctly, dichlorodiphenyl trichloroethane) in a pure form is a white crystalline solid. When this is distributed in a suitable way, as in a finely divided dust or in a spray, the crystals are highly toxic to many species of insects and act both as stomach and contact poisons. The most common formulations are (1) *solutions*, usually 5% in highly refined light petroleum oil. These are used for the control of household insects, and if applied thoroughly do a very effective job. One of the unusual features of DDT is its residual action. Minute (often invisible) deposits of DDT on walls,

woodwork, etc., have the property of killing insects for some time, provided, of course, that the insect comes in contact with the treated surface. The dealer should emphasize this feature of DDT sprays, since it represents one of the striking advantages of this substance. Oil solutions of DDT may be absorbed through the skin, however, so that care should be used in handling them. They should NEVER be applied directly to animals or plants.

Another popular formulation of DDT is (2) as a *wettable powder*. These powders may be suspended in water and the mixture applied as a spray to plants, buildings, etc. The residual action is the same as described above. Suspensions of wettable DDT in water may be applied to livestock, other than dairy cattle.

A third formulation of DDT commonly met with is (3)

the *emulsifiable concentrate*. These are liquids, and when diluted with water, form a stable emulsion. They are recommended for barn spraying as a residual spray, and in low concentrations on certain resistant crops. DDT is, of course, also formulated into (4) *dusts*. These are particularly useful on crop plants, and may be used on livestock. *Aerosol* (5) formulations of pyrethrum and DDT are available, and are useful as space sprays. It should be pointed out that in using aerosols there is rarely enough DDT applied for residual action.

The question of DDT residues on food and feed crops has been raised by many workers. Since DDT appears to be cumulatively absorbed by animals, excessive applications to edible crops should be avoided, and non-poisonous insecticides used wherever possible.

COMPATIBILITY OF COMMON SPRAY MATERIALS

	Lead Arsenate	Calcium Arsenate	Paris Green	Cryolite	Rotenone	Pyrethrum	Nicotine	DDT	Chlordane	BHC	Toxaphene	TEPP	Parathion	Summer oils	Dormant oils	Dinitro compounds	Lime sulfur	Wettable sulfur	Lime	Fixed coppers	Bordeaux	Dithiocarbamates
Lead Arsenate		OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Q	OK	OK	Q	Q	D	OK	OK	OK	OK	OK
Calcium Arsenate	OK		OK	NO	D	D	OK	OK	Q	NO	Q	NO	Q	OK	Q	Q	Q	OK	OK	OK	OK	Q
Paris Green	OK	OK		NO	NO	NO	OK	OK	OK	OK	OK	NO	Q	Q	Q	Q	NO	NO	OK	OK	OK	NO
Cryolite	OK	NO	NO		OK	OK	NO	OK	OK	OK	OK	Q	Q	OK	Q	Q	NO	OK	NO	Q	NO	OK
Rotenone	OK	Q	NO	OK		OK	OK	OK	OK	OK	OK	Q	OK	OK	Q	Q	NO	OK	NO	OK	OK	OK
Pyrethrum	OK	Q	NO	OK	OK		OK	OK	OK	OK	OK	Q	OK	OK	Q	Q	NO	OK	NO	OK	OK	OK
Nicotine	OK	OK	OK	NO	OK	OK		OK	Q	Q	OK	Q	OK	OK	Q	Q	OK	OK	OK	OK	OK	OK
DDT	OK	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK	OK	OK	NO	OK	NO	OK	OK	OK
Chlordane	OK	Q	OK	OK	OK	OK	Q	OK		OK	OK	OK	OK	OK	OK	OK	Q	OK	NO	OK	Q	OK
BHC	OK	NO	OK	OK	OK	OK	Q	OK	OK		OK	OK	OK	OK	OK	OK	NO	OK	NO	Q	NO	OK
Toxaphene	OK	Q	OK	OK	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	Q	OK	Q	OK	Q	OK
TEPP	Q	NO	NO	Q	Q	Q	Q	OK	OK	OK	OK		OK	OK	OK	Q	NO	OK	NO	Q	NO	Q
Parathion	OK	Q	Q	Q	OK	OK	OK	OK	OK	OK	OK	OK		Q	OK	Q	Q	Q	NO	OK	Q	OK
Summer oils	OK	OK	Q	OK	OK	OK	OK	OK	OK	OK	OK	Q	Q		OK	NO	NO	NO	OK	OK	OK	OK
Dormant oils	Q	Q	Q	Q	Q	Q	Q	OK	OK	OK	OK	OK	OK	OK		OK	NO	Q	Q	OK	OK	OK
Dinitro compounds	Q	Q	Q	Q	Q	Q	Q	OK	OK	OK	Q	Q	NO	OK	Q		Q	Q	Q	Q	Q	OK
Lime sulfur	D	OK	NO	NO	NO	NO	OK	NO	Q	NO	Q	NO	Q	NO	Q	Q		OK	OK	NO	NO	Q
Wettable sulfur	OK	OK	NO	OK	OK	OK	OK	OK	OK	OK	OK	Q	NO	Q	Q	Q	OK		OK	OK	OK	OK
Lime	OK	OK	OK	NO	NO	NO	OK	NO	Q	NO	Q	NO	NO	OK	Q	Q	OK	OK		OK	OK	Q
Fixed coppers	OK	OK	OK	Q	OK	OK	OK	OK	Q	OK	Q	OK	OK	OK	Q	Q	NO	OK	OK		OK	Q
Bordeaux	OK	OK	OK	NO	OK	OK	OK	OK	Q	NO	Q	NO	Q	OK	OK	Q	NO	OK	OK	OK		Q
Dithiocarbamates	OK	Q	NO	OK	OK	OK	OK	OK	OK	OK	OK	Q	OK	OK	OK	Q	OK	Q	Q	Q	Q	Q

OK= Fully compatible; Q=compatibility questionable; D=compatible, but may decompose on standing for any length of time; NO=not compatible.

Several compounds closely related to DDT are now available commercially. **TDE** (also called **DDD**; correctly named 1,1-bis(*p*-chlorophenyl)-2,2-dichloroethane) seems to have specific applications, such as in the control of the corn borer. **Methoxychlor** (2,2-di-*p*-anisyl-1,1,1-trichloroethane) is claimed to be more effective against certain insects than DDT, while it is less effective against others. It has the advantage of being less toxic to higher animals than DDT.

Chlordane (1,2,4,5,6,7,8,8-octachloro-4,7-methane-3a,4,7,7-tetrahydroindane) is an oily liquid, and is sold commercially in the same general types of formulations as DDT. It has many properties similar to DDT, including some residual action, although the effect is not so persistent. It has a slight odor, and possesses some fumigant action. Chlordane is highly effective against ants, but DDT is not effective against several species of ants. Chlordane is toxic to animals, and it should be used with care around foodstuffs and animals.

BHC (Benzene hexachloride); specifically the gamma isomer of 1,2,3,4,5,6-hexachlorocyclohexane) is more volatile than DDT, and, although it is a highly effective insecticide it is plagued with a strong, persistent musty odor. When applied to some crops it may impart this odor to the plant and thus render the crop unfit to use. Like DDT and chlordane, it is toxic to animals. It kills insects by contact, as a fumigant, and as a stomach poison.

Toxaphene (chlorinated camphene). This material is also a close relative of the materials mentioned above, and has some

of their properties. It has been found to be very effective against cotton insects, but not highly effective against certain others.

The **organic phosphates** and **thiophosphates** have been developed so recently that our knowledge of their strong and weak points is far from complete. **TEPP (Tetraethyl pyrophosphate)** is apparently very effective against aphids, thrips and mites. It has many of the same properties as nicotine, and indeed appears to be able to replace this material for most applications. It kills insects mainly by contact and fumigant action. It is known to be highly toxic to animals, and is readily absorbed through the skin, so that extreme caution should be observed in handling and applying the material. Fortunately, when mixed with water as a spray, TEPP is broken down quite readily, so that there seems to be little hazard from residues.

Parathion is related chemically to TEPP, and has many similar properties. It is several times as toxic as DDT, both to insects and animals, and should be treated with great caution. As our knowledge of this compound increases, it promises to be a very useful material when properly used.

It should be pointed out that, contrary to popular opinion, the names DDT, TDE, methoxychlor, chlordane, toxaphene, tetraethyl pyrophosphate and parathion are generic, and not trade names.

Another group of compounds which has had considerable attention in recent years are the pyrethrum substitutes and extenders. As mentioned earlier, these materials are mainly used

in household sprays. The more prominent compounds in this group are the organic thiocyanates (**Lethanes** and **Tha-nite**) which were used to a large extent in household sprays during the shortage of pyrethrum caused by the recent war. The pyrethrum extenders include the natural product *Sesamin*, and two new chemicals *Piperonyl butoxide* and *Piperonyl cyclonene*. The addition of a small amount of these materials to pyrethrum steps up the toxicity of the resulting spray and hence results in a superior product.

The **dinitro compounds**, including dinitro-ortho-cresol, the dicyclohexylamine salt of 2,4-dinitro-6-cyclohexylphenol and others are on the market. These are particularly useful as dormant sprays on fruit trees, but may cause injury if used on actively growing plants.

The petroleum oils are useful insecticides, used mainly on fruit trees and some ornamental shrubs. *Dormant oils* are of heavy body, and are used to destroy insect eggs which overwinter under and on the tree bark. Dormant oils should not be used on plants in leaf. It has recently been found that certain types of oils (high in aliphatic hydrocarbons) are more efficient insecticides than oils having high aromatic contents. *Summer oils* are less viscous, and are usually more highly refined for use during the growing season. Both types of oils are marketed as emulsions of the mayonnaise type, and in the miscible form. Since plant injury is likely to occur if too large quantities are used, the manufacturer's directions should be followed closely.

A few materials mainly used as fungicides also possess insecticidal properties. *Sulfur, lime sulfur* and *Bordeaux mixture* are examples of this type.

Many other chemicals have been suggested as insecticides, and

(Turn to page 85)

Trade names vs. generic names source of some confusion: DDT, TDE, methoxychlor, chlordane, parathion, tetraethyl pyrophosphate are generic.

USE of chlordane mixed with fertilizer materials for control of various insects infesting the soil has given satisfactory results from recent experiments. Such a mixture, broadcast over the soil surface and disced or harrowed in lightly, has proved successful as has the mixture when used as a "starter" or side dressing applied near the seed row, and preferably above it.

Broadcasting chlordane-fertilizer mixtures is preferred particularly on lawns, golf courses or pastures. It has also been effective in the treatment of soil for control of white grubs, mole crickets and wireworms attacking crops such as potatoes, as well as in growing plants as in nurseries and home plantings.

Stimulated plant growth has been reported from numerous areas where chlordane has been introduced into the soil. Some workers have attributed this increase in plant growth to a direct stimulation and others to the control of pathological organisms attacking the root systems. The writer has observed several hundreds of acres under test over the course of the past year in widely separated areas in the United States and in Canada, and it seems apparent that plant stimulation is attributable to the control of soil pests such as springtails, Tyroglyphid mites, Sciarid larvae and other small insects which have heretofore received but little attention. These pests may have escaped the pointed attention of entomologists largely because of the insidious nature of their attack. The greatest damage is done from the entrance into the plant of disease pathogens through feed scars. At any rate, the increased plant growth in chlordane-treated plots is considered by many growers to be too important to be overlooked. In some cases the increase in plant growth in the chlordane-fertilizer treated plots over plots treated with fertilizer alone has been greater than the increase

For Control of Soil Insects . . .

CHLORDANE IN FERTILIZER

By Dr. C. C. Compton

*Julius Nyman & Co.
Denver, Colorado*

from fertilizer alone, over the check plots.

Chlordane exhibits a wide margin of safety to plant roots. For example, dosages up to 20 pounds of actual chlordane per acre have not shown any ill effects on tomatoes or tobacco when applied broadcast. Fifteen times the required dosage to kill wireworms on tobacco has not caused injury when applied as a wettable powder in transplanting water.

The amount of chlordane to be added to fertilizer materials will depend upon the pests to be controlled, the length of time an effective residue is desired and the rate of fertilizer applications. From the standpoint of end use the amount of chlordane in fertilizer is best expressed in pounds per ton. This is easily translated into pounds per acre, commonly used terminology.

Chlordane is applied to the soil at rates varying from 1 pound per acre for the control of mole crickets to 8 or 10 pounds per acre for the control of Japanese beetle grubs. The latter, relatively high dosage, is required only where several years protection of turfs is desired. Application of chlordane-fertilizer mixtures to the surface of lawns, golf greens or pastures should be made prior to a rain or watered in with a sprinkler. Application to the surface of soil under cultivation should be made just prior to the last discing or harrowing. Chlordane in any preparation should not be deeply disced or plowed under.

One objection to adding chlordane to fertilizer has been raised on the premise that rates of fertilizer application vary for

different areas and different crops and therefore the deposits of chlordane will vary. It must be remembered rates of fertilizer application vary according to nitrogen, phosphorus, potash and minor elements they contain. With the exception of the small package business, fertilizers are sold for rather specific purposes and are not shipped great distances. Rates of application, therefore, do not vary sufficiently to change materially the rate of application of the chlordane contained therein. Because of the wide margin of safety to plant roots and its relatively low cost, chlordane can be added to small package fertilizers to give an effective soil insecticide when applied at rates within the range of performance and safety for the fertilizer alone.

Chlordane may be added to fertilizer as a diluted dust, as a wettable powder concentrate or as an emulsion concentrate. Satisfactory distribution of chlordane in fertilizer has been obtained by the use of 5% and 10% dusts, 25% and 40% wettable powders or by atomizing an emulsion concentrate into the fertilizer. Available equipment will determine the method of introducing the chlordane into the fertilizer.

Studies are under way to determine the stability of chlordane in fertilizer mixtures. Certain proprietary fertilizer mixtures containing chlordane have been under observation for 192 days and at the end of this time have not lost a measurable amount of chlordane. These tests

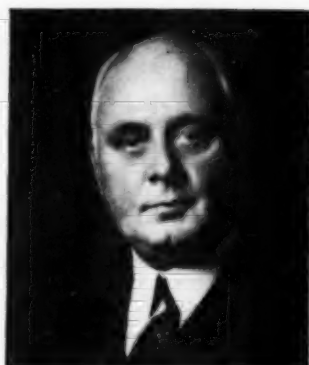
(Turn to page 93)



George F. Leonard



Paul G. Dunbar



Ernest T. Trigg

Speakers representing industry, government agencies, experiment stations and dealers, discuss problems of toxic residues, labeling, new regulations, at Rye, N. Y. meeting of

National Agricultural Chemicals Ass'n

S. A. Rohwer



C. E. T. Guterman



W. G. Reed





Lea S. Hitchner

IN THE PHOTOS:

George F. Leonard, president of the National Agricultural Chemicals Association, is executive vice-president of Tobacco By-Products & Chemical Corp., Louisville, Ky. He was president of the former Agricultural Insecticide & Fungicide Association and he continues as head of the succeeding association, the N.A.C.A. He was elected president in 1943.

Dr. Paul G. Dunbar is Commissioner, Food and Drug Administration, Federal Security Agency. He has played a prominent part in untangling numerous claims and counter claims about the danger of DDT to public health, and has been instrumental in putting the public straight on many of these matters.

Ernest T. Trigg is former president of the National Paint, Varnish & Lacquer Association, Inc., Washington, D. C. and is now chairman of the board. He has long been a prominent figure in paint trade association activities, having been a member of the Educational Bureau since 1906 and chairman since 1927. He is a former member of the board of Sherwin-Williams Co., and holds a number of directorates and offices in banking and financial institutions and on educational boards.

Lea S. Hitchner's connection with the old A.I.F. Association and its successor, the N.A.C.A., dates back to the founding of the A.I.F. in 1933. He was the group's first president and for the past number of years has been executive secretary and treasurer. He now makes his home in Washington, D. C., Association headquarters. The former A.I.F. office was located in New York City.

Dr. S. A. Rohwer is assistant Chief of the U.S.D.A. Bureau of Entomology and Plant Quarantine, Washington, D. C. and a familiar figure in numerous industry gatherings. He is immediate past president of the American Association of Economic Entomologists, and is active in other scientific organizations.

NACA SPRING PROGRAM

WESTCHESTER COUNTRY CLUB

Rye, New York, June 5th and 6th

The program for the 1949 Spring meeting of the National Agricultural Chemicals Association, as it stood at press time, called for the following order of events:

Thursday, June 5

N.A.C.A. President, George F. Leonard, executive vice-president of Tobacco By-Products and Chemical Corp., Louisville, Ky., opens the meeting at 10:30 with his annual address.

Following Mr. Leonard, Lea S. Hitchner, executive secretary and treasurer of the Association, Washington, D. C., presents his semi-annual report to the membership.

Dr. S. A. Rohwer, Assistant Chief, Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture, Washington, D.C., addresses the conference at approximately 11 o'clock, to be followed at 11:45 by Dr. Paul G. Dunbar, Commissioner, Food and Drug Administration, Federal Security Agency, Washington, D.C.

The entire afternoon is set aside for group conferences, com-

mittee meetings, and recreation, with the next official gathering being a 6 p.m. cocktail party.

Friday, June 6

FRIDAY's morning session begins with a talk by Dr. C. E. T. Guterman, director of the New York State Agricultural Experiment Station, Cornell University, Ithaca, New York. He speaks as chairman of the Liaison Committee, which comprises representatives of all phases of the agricultural chemical industry as well as allied interests.

Ernest T. Trigg is scheduled for his address at 11 a.m., preceding an open floor discussion of the operations of the the N.A.C.A. In charge of the forum is Wallace Moreland, assistant to the president of Rutgers University, New Brunswick, N. J.

Questions from the audience are to be answered by members of the forum following the formal discussion.

The N.A.C.A. board of directors holds its regular meeting Friday afternoon.

Dr. C. E. T. Guterman is Director of the New York State Agricultural Experiment Station, in connection with Cornell University, Ithaca, New York. He is chairman of the liaison committee between industry and the experiment stations. It represents all phases of the agricultural chemical industry as well as many other allied interests involved.

Dr. W. G. Reed is Chief, Insecticide Division, Livestock Branch, Production & Marketing Adm., U. S. Department of Agriculture, Washington, D. C. Dr. Reed has been a prominent figure in the current discussions regarding the application of insecticides on dairy cattle and other farm animals, and in helping to clarify new regulations for labeling and registration.



Insect

PHOTOS of insects in their natural habitat are specialties of Dr. Roman Vishniac, entomologist and photographer extraordinary, who presents the magnified shots of various insects and plant diseases seen on these pages.

Dr. Vishniac's apartment in New York, is a veritable laboratory with a number of microscopes, glass cages containing various live specimens of insects, and a sizeable "morgue" of pictures of all kinds of bugs. Included in his collection are numerous Kodachrome shots taken under high-powered microscopes of the interior of a mosquito's eye, for instance, and greatly-magnified pictures of other parts of insect pests.

How Dr. Vishniac became interested in this work is an interesting story in itself. His leaning toward scientific subjects began when he was a youngster in Russia. He left that country in 1920 and took up residence in Germany where he remained until the middle thirties. During this time he continued and expanded his studies, adding photography to his entomological interests, with the result that he compiled a sizeable collection of pictures of insects. He taught in a German university for a number of years.

Photos on this page: (Lower left) Close-up of chewing end of corn ear worm. (center) tank-like scale insects, greatly magnified. (top, left) photo of tomatoes hit by late blight. (top) Dr. Vishniac with his telescopic camera for magnifying insects cut-of doors.



Shooter

Upon leaving Germany, he established himself in Paris where a photo-scientific laboratory was maintained until the fall of France in 1940, at which time he came to the United States.

He lost no time in acquainting himself with the insects found on the American countryside, and for the past eight or nine years has been making field trips along river banks, in the forests, and in agricultural fields taking pictures of insects in their natural habitat. Dr. Vishniac dislikes photographing mounted specimens, because, in his opinion, they look artificial. Instead, he waits patiently sometimes for hours, for a tiny subject to get into an advantageous position. The result is, that the photographs are natural-looking, without being "staged."

Pictures made by Dr. Vishniac are used frequently by manufacturers of insecticides to illustrate the effect of a toxicant on a given insect pest over a period of minutes, or hours. Being a qualified entomologist as well as a photographer, Dr. Vishniac knows what to look for in taking the picture of any insect pest.

Photos on this page: (top, inside) codling moth emerging from surface of apple. (top, right) Japanese beetle. (center) Mexican bean beetle boring into plant to extract juices. (lower) Personality sketch of a grasshopper, with protective "armor" much in evidence.



Summary of Materials for CHEMICAL WEED

THE use of chemicals for weed control, while relatively new, is developing at such a rate that today there are available a number of quite diverse materials for such use. In addition to this growing list of herbicides are new terms and techniques which have become a part of the art and science. These must be understood in order to avoid errors in use and terminology. Thus, we speak of pre-emergence and post-emergence applications; of blanket or directed sprays; of contact and growth-regulating type herbicides; of selective and translocated materials. Any intelligent use of herbicides requires a proper knowledge of the chemicals used as well as an understanding of their physiological action on plants and the relation of environmental factors to their herbicidal efficiency. After we know what each material will and will not do, then we are in position to utilize them fully in agriculture. The purpose of this discussion is to consider briefly the principal herbicides which are commercially available.

2,4-D

THIS growth regulant type herbicide is widely used because of its unusual properties. It is highly effective in very low concentrations or very small amounts applied per acre against many unwanted weeds. The 2,4-D is absorbed through the foliage and translocated to the roots, resulting in the slow but certain death of susceptible plants. Since 2,4-D is known to affect broad-leaved plants much more severely than it does grass types, its use as a selective spray in cereal crops and pastures has become an accepted practice.

To put 2,4-D acid in usable form, the manufacturer must first convert it to a sodium or an amine salt, or to an ester form. The salts are highly soluble in water and are relatively non-volatile. The ester forms, however, are oil soluble and are much more volatile. The esters may be applied in oil, or formulated as emulsifiable oils for use in water sprays. Each form has its specific characteristics and uses. In addition to foliage applications, 2,4-D is effective as a pre-emergence spray to control germination of weed seedlings. All types of germinating seedlings appear to be susceptible

and any selective use of 2,4-D in pre-emergence sprays is dependent upon the retention of the chemical in the surface layer of the soil. This permits its use on certain crops tolerant to 2,4-D where the seeds, stems or roots are planted deeply and well below the chemically treated area, and grow through the chemical area without being injured seriously.

A related compound, 2,4,5-T (2,4,5-trichlorophenoxyacetic acid), and its derivatives have been found to be somewhat more effective on some kinds of weeds, especially on certain rosaceous plants like wild roses and briars and on brushy growth like the weed oaks (shinnery and Black Jack). It is being used presently in combination with 2,4-D in brush clearance. 2,4,5-T as well as 2,4-D may also be used to fortify oil type and phenolic herbicides.

Phenolic Herbicides

CERTAIN phenolic compounds are highly phytotoxic and have been used effectively as contact herbicides. The materials are not translocated, but depend on contact or burning action to kill plants. For this reason, thorough wetting of the plants is necessary. These materials generally are not effective against

by

T. C. Ryker

E. I. du Pont de Nemours & Co.
Baton Rouge, Louisiana

CONTROL

perennials. The principal chemicals of this group are pentachlorophenol and the dinitro compounds, such as dinitro-o-sec-butyl phenol and dinitro-o-amyl phenol. These have very low water solubility and are prepared as emulsifiable oil formulations. They may be applied as aqueous sprays or as oil sprays and are known as general contact herbicides. When prepared as salts, such as sodium pentachlorophenate and ammonium dinitro-o-sec-butyl phenate, they are water soluble and may be used as selective sprays on certain crops having waxy leaves. They are good examples of selective contact herbicides. Their selective action is believed to be largely physical in nature in that there is differential wetting of crop and weed foliage. Both the phenols and the phenates may be used as pre-emergence sprays in many large seeded crops such as beans and cotton where in addition to contact action these compounds have residual action for varying periods of time. The dinitros tend to be more effective against broad-leaved weeds than against grasses.

Cyanamid

CALCIUM cyanamid has been used extensively as a defoliant in cotton and recent work indicates

that at relatively high dosages it may be used also for weed control. The herbicidal action is dependent upon the free cyanamid which is formed in the presence of moisture such as dew. The quicker acting monosodium cyanamid also has been tried. In addition, another compound, potassium cyanate, has been found to have high contact herbicidal action as well as selective action in some crops such as onions and the waxy cole crops.

Oils

OILS vary widely in their phytotoxic properties. Their action is as contact herbicides, and high aromatic types are usually the more toxic. They are highly toxic to many grasses. Certain of the lighter oil fractions such as Stoddard Solvent have been used as selective sprays for weeding of carrots. Oils may be fortified with 2,4-D and with the phenolic herbicides to enhance and supplement their general weed killing properties. The oils, as well as the phenols, may be used in crops when applied as directed sprays.

Sodium Trichloroacetate

THE salts of trichloroacetic acid, such as sodium and ammonium TCA, are highly effective against grass species. For foliage applica-

tion, they are used as general contact sprays, but are translocated to some degree at least. When applied to soil, they tend to be more effective against grass species than against broad-leaved plants. The soil sterility is of relatively short duration, 2 to 4 months. These are the first herbicides that have shown promise in controlling prickly pear cactus and the three major perennial grass weeds, namely, Johnson, Bermuda, and quack grasses, in crop lands. For established grasses, rates of 100 to 200 pounds per acre are required, but for grass seedlings much lower rates may be used. The sodium TCA will be marketed as a 60 percent material.

Chlorates

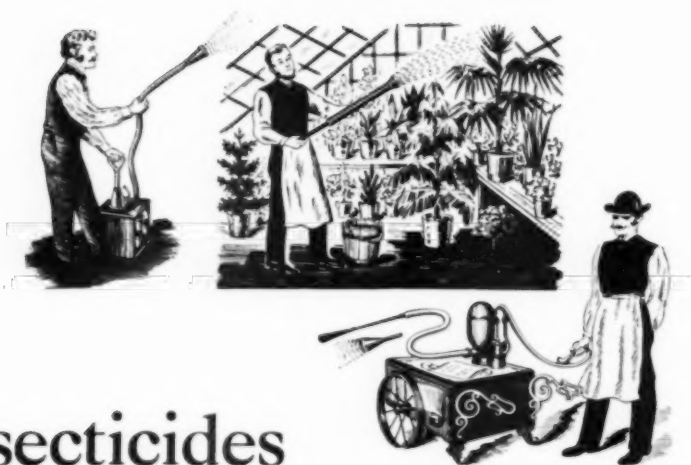
SODIUM chlorate has been extensively used as a soil sterilant in spot application or on non-agricultural land where the prolonged soil toxicity is not an important consideration and may be an advantage. Because of the fire hazards involved in the use of the technical grade chemical, it is usually formulated with a safener such as has been done in the proprietary product, "Atlacide." When applied at rates of 400 to 600 pounds per acre, this herbicide has been highly effective for the control of Johnson grass on ditch banks and head lands.

Ammonium Sulfamate

THIS herbicide has been used extensively for the control of brush or woody plants. The chemical is translocated and may be applied as a foliage spray to growing brush, as the dry salt to cut stumps, or in cups cut around the bases of weed trees such as Black Jack oak. It may be used as a soil sterilant, but high rates are necessary to obtain maximum effectiveness. The soil sterility caused by ammonium sulfamate is of short duration generally.

Extensive search is being made for new herbicides and today there are a number that are available for experimental testing.

*Paper presented before S.E. Section, American Society of Agricultural Engineers.

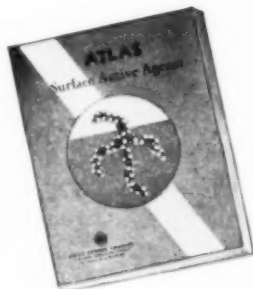


Insecticides Can Become "Quaint" Too!

Collectors of antiques might call these spraying rigs of fifty years ago "quaint." Obviously, they were outmoded years ago. The same thing can be true of emulsion formulations that just a few years ago represented the best of the day. *New* emulsifier developments make much of the earlier emulsion data "quaint"—obsolete.

Atlas can help you bring *your* insecticide and herbicide emulsion formulas up to date . . . help you add new killing-power to new toxicant developments. Chapter 5 of the new Atlas Surface Active Agents book gives you the latest data on this subject, together with many actual formulas.

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A New Insecticidal Material Shows Promise in Preliminary Tests. Low Toxicity Feature of

RYANIA INSECTICIDES

RYANIA is a recently discovered insecticide of botanical origin possessing unique properties. It is toxic to a wide range of insect species, yet it appears to offer little or no hazard of toxicity to man in application or as a residue on crops. Likewise it has not demonstrated any phytotoxic properties. Its active principles are unusual in being water soluble yet of high stability in storage and on exposure to light. Ryania has been most widely recognized as a control for the European corn borer. Extensive investigation by state and federal workers has consistently demonstrated its effectiveness in the control of this insect and has shown that it is equally as effective as, and frequently more effective than, DDT. Its recommendation for use in corn borer control has been made by the state and federal entomologists meeting in New York, December 12, 1948.

Sources of Ryania Insecticides

RYANIA is a tropical American genus of shrubs and small trees belonging to the family Flacourtiaceae. The principle source of insecticidal material has been the stem wood of *Ryania speciosa*, a species native to Trinidad. Other species occur in different areas of northern South America and in the Amazon Basin. These species appear to contain principles similar to those found in *Ryania speciosa* although

generally at lower concentrations. The insecticidal principles of Ryania are found in the root and stem of the plants, with the greater concentration being in the root material. No significant concentration of the principles has been found in the leaves. The use of stem wood as the source of commercial Ryania insecticides has been indicated by the greater availability of this part of the plant in larger quantities and by the re-forestation benefits to be gained by leaving the roots intact for further production of Ryania stem wood by coppice growth.

Discovery and Development

RYANIA was discovered in the course of a cooperative research program by the Research Laboratories of Merck & Co., Rahway, N. J., and the Department of Entomology of Rutgers University and the New Jersey Agricultural Experiment Station. This program was directed toward the survey of materials of botanical origin from all parts of the world in search of new materials of insecticidal value. This investigation involved the ex-

amination of approximately twenty-five hundred plant species of which *Ryania speciosa* was the first to demonstrate high insecticidal activity.

The first examination of Ryania under field conditions was made at the New Jersey Agricultural Experiment Station in 1943 using the ground root of *Ryania speciosa*. It was recognized to be outstandingly effective against the European corn borer. Further work in New Jersey and New York established that the ground stem of *Ryania speciosa* likewise was effective in control of this species and this work was the basis of the first report of the insecticidal activity of Ryania by Pepper and Carruh (1945). These and other practical investigations have established that dusts prepared from the ground stem of *Ryania speciosa* in concentrations of 30 or 40 per cent or aqueous-suspension sprays of this same plant material are effective practical controls for the corn borer.

Activity on Other Species

IN tests against other insect species Ryania has been found to be most effective against the sugarcane borer. The reports of Dugas et al. (1947) (1948) and Ingram (1947) (1948) have shown that Ryania dusts have given equal or better control of the sugarcane bor-

by

Dr. Ralph E. Heal

Merck & Co., Inc.
Rahway, N. J.

NOW! protect truck crops with **KRYOCIDE** NATURAL GREENLAND CRYOLITE

- Not acutely toxic to warm blooded animals
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Melon Worm
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and many others

Thousands of truck farmers are again using Kryocide—the natural Greenland cryolite insecticide—to combat the ravages of chewing insects. Kryocide is safe to use, it will not harm humans and is safe on practically all crops... Easy to apply as a dust or a spray.

Cryolite is also recommended for such crops as peanuts... and the hay may be used for forage following harvest. For truck crops or other uses Kryocide alleviates an increasingly important residue problem.

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Other Penn Salt insecticides include:

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- DDT Compounds
- Fenitrothion (Fenthion)
- Permethrin

er than cryolite, which has been the recommended insecticide. Advantages of *Ryania* for use in sugarcane borer control are the absence of any deleterious effects to the crop and the fact that it does not appear to induce heavy infestations of aphids.

Against the oriental fruit moth, Wheeler (1945) and Wheeler and LaPlante (1946) have reported the effectiveness of *Ryania*. They found it to be highly toxic to this species but to require more frequent application than did DDT.

In reporting work against the elm leaf beetle, Gambrell (1948) listed *Ryania* as one of the insecticides of potential value in control of this species.

Reports of the activity of *Ryania* against other species have been made by the following investigators: Carruth and Hervey (1947) squash borer; Dills and Odland (1948) cabbage caterpillars; Hough and Hill (1947) codling moth; Ivy and Ewing (1947) cotton bollworm and southern green stink bug; Kulash (1947) soybean caterpillars; and Kulash (1948) corn earworm. Although these investigators found *Ryania* to be toxic to the respective species, the activity has not been considered sufficient as yet to justify recommendation for use in practical control.

The following reports of negative results with *Ryania* insecticides have been made: Cockerham and Deen (1948) sweet potato weevil; Dills and Odland (1948) cabbage maggot; Hockett (1946) cauliflower worms; Polivka (1947) Japanese beetle larvae; Rainwater and Bondy (1947) boll weevil and cotton aphid; and Snapp (1948) plum curculio.

The general activity of *Ryania* against a wide range of species makes it an excellent insecticide for home garden use. Treatments of such plantings with *Ryania* dusts on a 5-7 day schedule throughout the season has resulted in almost complete freedom from insect attack without injury to the crop.

The characteristic action of *Ryania* is such as to produce a rapid

cessation of normal activity, often without producing death for several days. This requires consideration of protective effect in conjunction with mortality determinations to establish the true value of the product under field conditions.

Toxicology and Pharmacology

It was recognized early in the investigations that the concentrated active principles from *Ryania* insecticides were quite toxic to mammals as well as to insects. To establish the safety of use of powdered *Ryania* stems as an insecticide, an extensive investigation was undertaken by the Merck Institute for Therapeutic Research. This work has been reported by Kuna and Heal (1948). They established the acute oral toxicity of powdered stem of *Ryania speciosa* to be 1200 mg./kg. in rats, 150 mg./kg. in dogs, more than 400 mg. kg. in monkeys, 650 mg. kg. in rabbits, 650 mg./kg. in mice, 2500 mg./kg. in guinea pigs and more than 3000 mg./kg. in chickens. Chronic oral toxicity studies with this same material demonstrated that it was possible to maintain rats, chickens or guinea pigs for at least 5 months on a diet containing 1 per cent of the *Ryania* powder without producing symptoms of cumulative poisoning. Direct comparisons of this *Ryania* powder with DDT and cube powders in chronic administration showed that the *Ryania* powder is tolerated in larger amounts and for a longer period of time than either DDT or cube. A consideration of the demonstrated toxicity levels of *Ryania* powder in relation to the amounts of insecticidal residues normally encountered on forage and food crops indicated that a great safety factor exists for the use of this insecticide.

Chemistry of *Ryania*

An extensive investigation of the chemistry of *Ryania* principles has been conducted in the Research Laboratories of Merck & Co. The first report of the findings of this investigation has been made by Rogers et al. (1948). They found

that the insecticidally active principles can be extracted with water and many organic solvents and that quantitative extraction may be secured by the use of water, methanol, or chloroform. They were able to isolate an alkaloidal principle from *Ryania speciosa* which they have designated "ryanodine." This principle has approximately 700 times the insecticidal potency of the stem wood of *Ryania speciosa*.

Ryanodine is neutral to litmus and forms no salts. It is soluble in water, alcohol, acetone, ether, and chloroform; difficultly soluble in benzene; and insoluble in petroleum ether. The distribution coefficient of ryanodine for ether/water is 1.3. The ultra-violet absorption spectrum shows a maximum at 2685 Å (E:1% cm. = 352) in alcohol solution. A tentative empirical formula of $C_{25}H_{35}NO_9$ or $C_{26}H_{37}NO_9$ has been suggested for ryanodine. The structural formula has not been established.

Laboratory Tests

The discovery of *Ryania* in the previously mentioned survey program was made by the injection of aqueous extracts into the bloodstream of the American cockroach. The technique of this test has been described by Heal and Menusan (1948). In this test an extract of *Ryania speciosa* root with water in the ratio of 1:10 by weight injected at the rate of 40 cc./kg. produced an almost instantaneous toxic reaction without recovery. Subsequent contact tests by the measured-drop technique with the German cockroach and the milkweed bug showed positive activity with alcoholic extracts but no activity with petroleum ether extracts. Injections of aqueous and alcoholic extracts into the crop of the American cockroach revealed that *Ryania* was toxic as a stomach poison as well as a contact agent.

Following this primary demonstration of insecticidal activity, exploratory tests were made with a wide range of insect species under insectary conditions. In this

(Turn to page 89)

Experiment Station Bulletins

Sweet Potato Weevil Control

The U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, has recently issued copies of a report, "Laboratory Tests of New Compounds as Insecticides Against the Sweetpotato Weevil" by P. K. Harrison, Division of Truck Crop and Garden Insect Investigations. Copies of the report are available as E-770. The tests were conducted in cooperation with the Louisiana Agricultural Experiment Station and the Louisiana State Department of Agriculture and Immigration.

DDT Residues Studied

Necley Turner and Nancy Woodruff, Connecticut Agricultural Experiment Station, New Haven, have recently published a bulletin on "Toxicity of DDT Residues: Effect of time of exposure of insects, coverage and tenacity." The study covers factors which might cause variations in results of tests for toxicity of DDT residues using house flies and other insects.

NY Station Report Out

The sixty-seventh annual report of the New York State Agricultural Experiment Station, Geneva, has been released. It contains summaries of work conducted in entomology, plant pathology, fertilizer research, seed testing and general agricultural practices, with reports of the heads of departments.

Boits vs. Sprays for 'Hoppers

The U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, has published a recent bulletin (E-771) presenting data on the comparative effectiveness of poisoned bait and sprays for grasshopper control in Lyman

County, South Dakota. The paper is by R. L. Shotwell, Division of Cereal and Forage Insect Investigations. Tests with chlordane emulsion sprays, with toxaphene emulsion sprays and poisoned bait are reported in detail with numerous tables showing results.

Legumes Seed Treatment

The Oklahoma Agricultural Experiment Station, has just issued a new bulletin No. B-332 giving results of an investigation of "Seed Treatment for Field Legumes." The tests were conducted to investigate the comparative effectiveness of the value of the materials, "Arasan," "Phygon," "Spergon," "Dow 9B," and "Ceresan M" for treatment of seed of alfalfa, mungbeans, Chinese Red cowpeas, Austrian winter peas, yellow hop clover, and hairy vetch. Copies of the bulletin are available from the Oklahoma Agricultural Experiment Stations, Oklahoma A. & M. College, Stillwater. The authors of the bulletin are A. J. Vltos and D. A. Preston. The research on which their findings are based was supported in part by the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn.

Weed Conference Bulletin

The Northeastern Weed Control Conference has issued the first of a series of quarterly newsletters outlining experimental weed control work being carried out by various agricultural experiment stations. A summary of recommendations of stations in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia appear, in the first issue. Technical information on herbicides is also included, as is a list of current literature on the subject.

In the preface, the newsletter points out that since the Conference's Policy Committee found it impractical to form a definite policy concerning use of herbicides under the wide variety of conditions found in the northeast, the mimeographed publication will present the official position of each agricultural college in the area. Robert H. Beatty, American Chemical Paint Co., Ambler, Pa., is chairman of the Publications Committee.

Phenylhydrazides Described

The U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, has recently released mimeographed copies of a report, "Preliminary Tests of Certain Phenylhydrazides as Insecticides" by G. T. Bottger and A. P. Yerington. Copies of the report are available under the No. #769.

Seek Nicotine Synergists

The fifth of a series of U. S. Department of Agriculture bulletins reporting investigations on nicotine insecticides, has recently appeared as bulletin E-768. (The four previous ones were: E-646; E-720 and E-725.) This latest paper continues the studies, and presents results obtained with 107 additional materials. The work was conducted under the general supervision of G. T. Bottger.

Cattle Grub Bulletin

New Jersey Agricultural Experiment Station, New Brunswick, N. J., has issued Circular 522, on the control of cattle grubs. The bulletin recommends dusting with 5 per cent rotenone powder diluted with three parts of diluent. In sprays, a mixture of 7½ pounds of derris or cube powder containing 5 per cent rotenone in 100 gallons of water is sufficient.

None of the newer insecticides such as DDT, benzene hexachloride or chlordane have proved satisfactory in cattle grub control, it is stated.

AGRICULTURAL CHEMICALS

Stability of 2,4-D when stored with

MIXED FERTILIZER

by

Paul C. Marth,

John O. Hardesty

and John W. Mitchell*

IN previous studies by authors Marth and Mitchell, it was found that mixed fertilizer could be used as a carrier for the herbicide, 2,4-D in treating grassy areas for control of weeds. These investigations revealed that the mixture, when applied in the fall or spring of the year at the rate of 600 pounds of fertilizer containing 1.5 to 3 pounds per acre of 2,4-D, killed many lawn weeds and at the same time caused the grass crop to increase as a result of the nourishing action of the fertilizer and the significant reduction in the competition of weeds.

The experiments reported in this paper were undertaken to determine the effect on the herbicidal properties of 2,4-D mixed in fertilizers, with respect to length of storage, moisture content, and high temperature. The mixture used throughout the experiment was formulated to contain typical constituents found in present-day mixtures. This mixture, containing 200 pounds of magnesium limestone per ton, had a net

physiological acidity equivalent to 356 pounds CaCO_3 . Relatively large amounts of nitrogenous organic material were included to allow considerable moisture absorption without causing the mixture to become too wet. Of the total nitrogen present, 16.7 percent was from the nitrate ion, 58.0 percent from the ammonium ion and 25.3 percent from the natural organic nitrogen carriers. The 2,4-D (acid) was first thoroughly mixed with the finely ground limestone before incorporation into the mixture. The final mixture contained 0.5% 2,4-D so that applications of 600 pounds per acre delivered 3 pounds of the herbicide.

Beginning on June 18, five freshly-prepared 25-pound lots of the fertilizer-2,4-D mixture were

subjected to the following variations in storage temperature and moisture content prior to testing; Lot 1 was stored continuously at 30°C., with moisture content of 7.05% at mixing; Lot 2, stored at 60°C. for 2 weeks from then at 30°C., moisture same as Lot 1; Lot 3, stored continuously at 30°C., moisture content 4.8%; Lot 4, stored 2 weeks at 60°C. then at 30°C., moisture content same as Lot 3; Lot 5, dry fertilizer mixture (2.33% moisture) to which 2,4-D (acid) was added immediately before use. Each lot was stored in an air-tight container.

After storage periods of 1 month, 3 months, and 10 months, aliquots of the mixtures were re-milled and weighed to provide an application rate of 600 pounds per acre to plots of established weedy sod.

The area of established sod selected for experimentation was composed mainly of Kentucky bluegrass, redtop, and fescue grasses heavily infested with narrow-leaved plantain (*Plantago*

(Continued on page 82)

TABLE

Average fresh weight of clippings of grass and weeds obtained from 5 sod plots of 50 sq. ft. area each, following applications of fertilizer mixtures containing 0.5% of 2,4-D (acid) which had been stored 3 and 10 months at varying temperatures and moisture content prior to use.

Lot No.	Fertilizer—2,4-D Mixture		Stored 3 Months September 26, 1946			Stored 10 Months Tested April 24, 1947		
	Percentage moisture at mixing	Maximum storage temperature	Grass (gms)	Weeds (gms)	Percentage of weeds	Grass (gms)	Weeds (gms)	Percentage of weeds
1	7.05	30	802.4	1.8	0.22	760.6	2.7	0.35
2	7.05	60	630.2	4.3	0.68	773.2	4.4	0.57
3	4.87	30	665.6	8.7	1.29	758.4	1.8	0.24
4	4.87	60	735.2	5.0	0.68	818.0	2.0	0.24
5	2,4-D added on date tested		616.2	2.2	0.36	744.6	2.8	0.37
6	No fertilizer and no 2,4-D		141.2	32.2	18.57	262.4	113.8	30.25
7	Fertilizer only		—	—	—	463.2	251.4	35.18

*All mixtures were applied at the rate of 600 pounds per acre, delivering 3 pounds per acre of 2,4-D (acid).

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—Mt. Washington Hotel, Bretton Woods, N. H.

American Plant Food Council to look into Future of FERTILIZER

THE American Plant Food Council, Washington, D. C., has announced the complete program for its fourth annual convention to be held at the Mount Washington Hotel, Bretton Woods, N. H., June 19-22.

Registration will take place on Sunday, June 19, with a meeting of the Board of Directors scheduled for that evening. The convention proper will open at 10 Monday morning, with an address by the A.P.F.C. president, Clifton A. Woodrum. Prominent guests will be introduced to the group, and committees will be named.

Following this, an agricultural panel will discuss the subject, "Fertilizer, Farming and the Future," with Dr. Paul D. Sanders, Editor of *The Southern Planter*, Richmond, Va., as moderator. Members of the panel are to include, in addition to Dr. Sanders, the following: Dr. Robert F. Chandler, Jr., Director, Agricultural Experi-

ment Station, Dean, College of Agriculture at the University of New Hampshire, Durham; Dr. Ralph W. Cummings, Associate Director, N. C. Experimental Station, State College, Raleigh; Representative Charles B. Hoeven (R-Iowa), Member of House Committee on Agriculture; Dr. W. H. Pierre, Head of Agronomy Department, Iowa State College, Ames; and Dr. Robert M. Salter, Chief, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

The afternoon is left open

for informal gatherings, golf and other recreation. Dancing is scheduled for the evening.

Tuesday's activities begin with an address by Dr. William I. Meyers, Dean of Agriculture, Cornell College of Agriculture, Ithaca, N. Y. He will be followed by two 4-H representatives, each a National 4-H Club Leader: Miss Rita Bott, Triadelphia, W. Virginia, and Francis Pressly, Stony Point, N. Carolina. A business session, with committee reports, and election of members to the board, will complete the activities of the morning. The afternoon, again, is left open for recreation, with a cocktail party scheduled for 6:30 P.M.

Representative Harold D. Cooley, N. Carolina, chairman of the House Committee on Agriculture, is scheduled to speak at the annual dinner to be held Tuesday evening.

Wednesday's program will
(Turn to page 87)

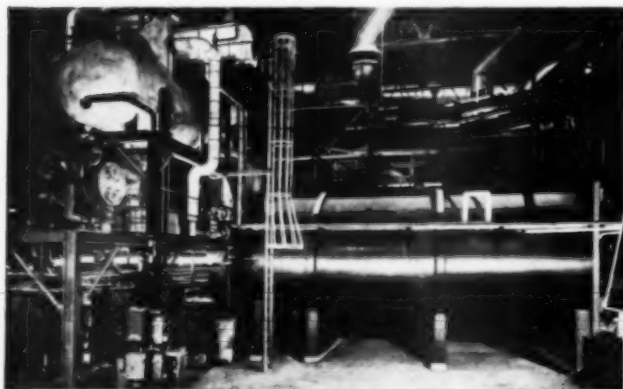
Below (left) Rep. Howard D. Cooley, N. Carolina, Chairman of House Agriculture Committee. (Right) members of the American Plant Food Council Convention Committee are shown discussing the program. They are Chairman J. A. Howell, (left), executive vice-president, Virginia-Carolina Chemical Corporation, Richmond, Va.; C. B. Robertson, (center) president, Robertson Chemical Corporation, Norfolk, Va. and Fred J. Woods, vice-president, Gulf Fertilizer Company, Tampa, Fla., who is also Chairman of the Council's Executive Committee.



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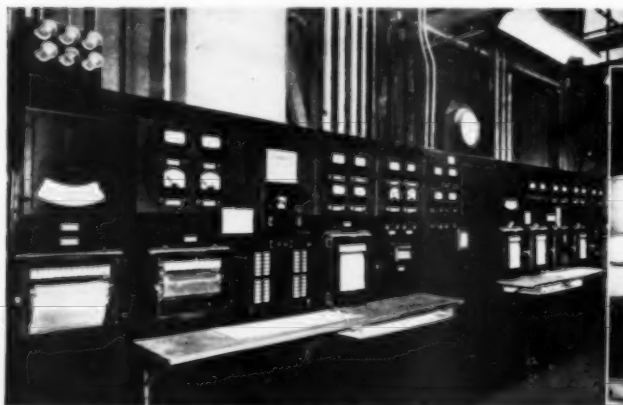
This sixth Chemico Contact Sulfuric Acid Plant for Standard Wholesale Acid and Phosphate Works in Baltimore, Md. was successfully placed in operation in December, 1948 and is regularly operating above guaranteed capacity of 500 tons per day. (100% equivalent H_2SO_4).



▲ At the right is the Sulfur Furnace with the waste heat boiler, condenser and auxiliary apparatus at the left. This furnace burns over 170 tons of sulfur a day.

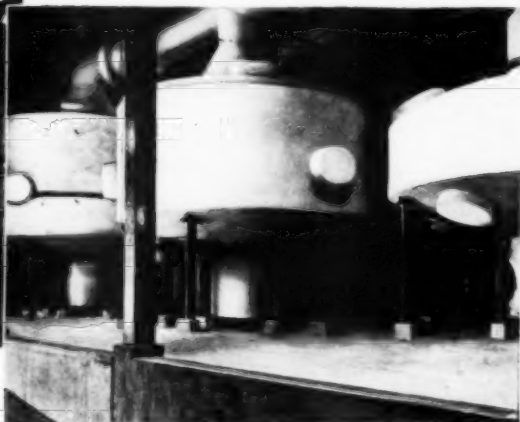


▲ Towers for the production of oleum, 98% acid and for the drying of combustion air. These are part of the drying and absorption system.



▲ Here are control panels for two of the six Chemico Contact Acid Plants. The new 500-ton plant panel is on the right.

▼ Shown left to right are the secondary converter, the primary converter and the gas filter.



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24th Annual Convention of

National Fertilizer Association

Scheduled for June 13-15

FEATURING speakers representing governmental agencies, the agricultural chemical industry and allied industries, the program for the National Fertilizer Association's 24th annual June convention was virtually complete as we went to press. The meeting, to be held at the Greenbrier Hotel, White Sulphur Springs, W. Va., will continue for three days, beginning June 13.

Louis Bromfield, Lucas, Ohio, author of "Malabar Farm" and other books on the subject of agriculture will appear on the program, as will Charles H. Mahoney, director of the National Canners Association, Washington, D.C.; and John H. Davis, secretary of the National Council of Farmer Cooperatives, also of Washington, D.C.

The National Fertilizer Association president, Dr. Russell Coleman, will present his annual address, and Ray King, Valdosta, Ga., chairman of the NFA board of directors will also speak. Acceptance of an invitation to speak was expected from a high official of the U.S. Department of Agriculture, as we went to press.

Business sessions of the Association will be held at different

times during the three days, with the annual meeting of the board being scheduled for the morning of Monday, June 13. The annual banquet is to be held on the evening of Tuesday, June 14.

Committees in charge of recreational events have been named by NFA as follows: Golf events: A. L. Walker, Jr., Texas Gulf Sulphur Co., New York, chairman. Members of his committee include: B. A. Crady, Morton S. Hodgson, Tom L. Jones, John W. Rutland and H. B. Siems. Tennis: James C. Totman, Summers Fertilizer Co., Bangor, Me., chairman. Committeemen are: James C. Cope, Charles

F. Martin and Mrs. Garland D. Glover. Horseshoe Pitching: A. A. Schultz, Reading Bone Fertilizer Co., Reading, Pa., chairman. Other members are C. R. Martin and H. A. Parker. Ladies' Events committee is headed by Mrs. J. E. Totman, Baltimore, Md. Her committee consists of Mrs. E. M. Kolb, Mrs. Roy S. Marsden, Mrs. J. P. Brinton, Jr. and Mrs. Frank R. Dulany.

The Bridge Committee is under Mrs. Burton A. Ford. Her committee is composed of Mrs. R. D. Martenet, Mrs. Weller Noble, Mrs. R. A. Oliphant and Mrs. W. S. Tyler.



General view of the Greenbrier Hotel, White Sulphur Springs, W. Va., scene of the 24th annual NFA convention.

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The Listening Post

Control of Mushroom Diseases in California

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

PETER A. ARK of the University of California reports that although mushroom growing is an old and well-established business in California, there are relatively few mushroom growing establishments, but many of these comprise from 4,000 to 5,000 square feet of space. All growers use a standard type of bed construction and most employ modern equipment in handling composts and soil. However, the rather common occurrence of diseases is due to faulty control of fermentation of manure as well as unfamiliarity with disease symptoms and control measures.

Bacterial spot caused by *Phytophthora tolaasi* caused serious loss in white mushrooms in one location a few years ago but is now seldom encountered. The disease started in several places in each bed and spread very rapidly. Saprophytes following the bacterium changed the mushrooms into a soft mass. The soil reaction in the beds was pH 5.5. The crop was saved by removing the diseased mushrooms, sprinkling the beds with lime water until the pH was 7.6, and applying 2-2-50 Bordeaux on top of the casing soil. As a result of this treatment, the new growth of mushrooms was entirely free and the grower was able to harvest two good crops.

The fungus *Verticillium* sp., causing the so-called dry bubble disease was found in a great number of mushroom houses where casing soil was not sterilized before the beds were filled. It has been found to be very serious after the

first flush of mushrooms. It was especially severe in houses with poor sanitation.

Dactylium sp. caused about 50 per cent loss in the crop in one house.

Of the diseases due to improper handling of compost, the most frequent were brown plaster mold (*Myriococcum praecox*), white plaster mold (*Monilia fimicola*), and *Chaetomium* sp.

All of the diseases mentioned were controlled with varying degrees of success. Those due to faulty fermentation of manure were checked by correcting the errors of composting. The soil-borne diseases were completely eliminated by fumigation with chloropicrin. Most satisfactory soil sterilization was obtained by injecting 3 ml. of chloropicrin gas per cubic foot of soil at 6 inches depth and sealing it with water. In cases where several one-foot layers were treated, only the top layer was sealed with water and a tarpaulin or similar cover was thrown over the top. The gas was allowed to act for 3 days or longer at temperatures not below 56 deg. F., after which time the soil was uncovered and ventilated for 7 days or longer, or until no chloropicrin odor could be detected. The handling of chloropicrin was not found to be especially disagreeable when it was dispensed in small lots (1-pound size bottles). The dosage of the gas was controlled with a high degree of precision by the use of a new type of fumigating gun manufactured in San Francisco. The gun is



made of a special non-corroding alloy and is exceedingly easy to handle either in the field or in the greenhouse. It is built in such a way that it indicates when it is empty and needs refilling. Formalin fumigation, although cheaper, was found to be unreliable since it did not give reproducible results.

Controlling Stem-End Rot of Muskmelons in New York

Michael J. Papai, Assistant County Agricultural Agent in Orange County, New York, reports success from a trial attempt to control an undetermined stem-end rot of muskmelons. Iroquois and Bender varieties grown by one farmer in 1947 tended to show severe rotting from the time they were harvested until they were sold later on the roadstand. Mr. Papai suggested the trial of some non-poisonous fungicide. Accordingly, copper sulfate and elemental sulfur, which were available, were applied by dabbing a small bag of dust against the moist stem end immediately after picking. The sulfur dust gave very good results and lengthened the life of the melons by many hours. The dust had two advantages: first its fungicidal effect, and second its tendency to dry and cauterize the scar. In 1948 a fine brush was used, which permitted application to a more specific area. The cause of the rot and the possibility of better control from other fungicides, such as "Fermate" or "Zerlate," require further study.

Warning Service Report

LATE blight (*Phytophthora infestans*) was first noticed in south Florida about November 26 in a potato field near Belle Glade. Favorable weather induced rapid spread in inadequately sprayed fields and by December 15 it was evident that some fields would sustain losses up to 75 per cent. The uniformity of blight appearance suggested that infection originated from spore showers from outside sources. There was no indication of focal points of infection within fields from infected seed tubers. Heaviest infection appeared in the older fields.

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Excellent control was obtained with either "Parzate" Liquid or "Dithane D-14." One grower used Bordeaux-sulfur spray, applied it poorly, and lost heavily. He planted 5 cars of seed and harvested 13,000 bushels of potatoes. Another grower adjacent planted 4¾ cars of seed, did a reasonably good job of spraying with "Dithane D-14," and harvested over 20,000 bushels. The yield difference resulted primarily

from the difference in disease control.

Tomato late blight appeared at Indiantown by the end of November but subsequent weather was unfavorable and damage was negligible. The freeze of January 2 finished the tomato crop in this area, and killed all the potatoes and tomatoes in the Belle Glade section.

(Turn to page 91)

Insect Conditions During March, Early April

This column, reviewing current insect control programs, is a regular feature of **AGRICULTURAL CHEMICALS**. Mr. Haussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By **G. J. Haussler**



COOL weather during the last half of March apparently retarded the emergence of Mexican bean beetles in Florida. The adults had appeared in northwestern sections of that state and in southern Georgia in only limited numbers by April 1, insecticide applications being required in only a few instances. A few bean leaf beetles had begun to make their appearance in South Carolina, Georgia, and Florida by the end of March. The serpentine leaf miner and leafhoppers continued to infest snap beans in light numbers in parts of Florida during the last half of that month.

Infestations of cabbage caterpillars continued to be generally light on cole crops from Virginia to Florida, and in Louisiana during the last half of March. Aphid infestations remained generally light during that period in most states reporting. However, serious infestations of the cabbage aphid, requiring insecticide applications, were reported from southern California around the middle of March, and toward the end of the month heavy infestations of that insect were present in eastern Virginia and in the

lower Rio Grande Valley of Texas. Heavy infestations of corn earworm larvae were also present on cabbage at that time in the latter area, and thrips were numerous on cabbage in eastern Virginia. Other pests reported attacking cabbage and related crops during the last half of March included the serpentine leaf miner, the harlequin bug, and the vegetable weevil in Florida, and the vegetable weevil and striped flea beetle in Louisiana. The infestation of the yellow-margined leaf beetle in the Mobile area of Alabama had decreased by the middle of March to the point where only limited numbers were present.

Aphids were present in light to moderate abundance in most of the southern states from which reports were received during the last half of March. They were infesting such crops as spinach, peppers, peas, lettuce, tomato, tobacco, celery, cucumber, watermelon, and strawberries. Toward the first of April a severe infestation of aphids was reported from one large tobacco plant bed in South Carolina. Only very light aphid infestations were present at that time in tobacco plant beds in Georgia and Florida.

The two-spotted spider mite caused a considerable amount of damage to strawberries in eastern Virginia during the last half of March and was also reported infesting that crop in southern California.

By the first of April, the Colorado potato beetle had begun to appear in South Carolina, Georgia, and Florida. Moderate infestations of the onion thrips were reported in onions during the last half of March from eastern Virginia, South Carolina, Florida, Louisiana, and the lower Rio Grande Valley of Texas. Toward the first of April the tomato fruitworm was damaging tomatoes and the corn earworm was injuring onions in the latter area.

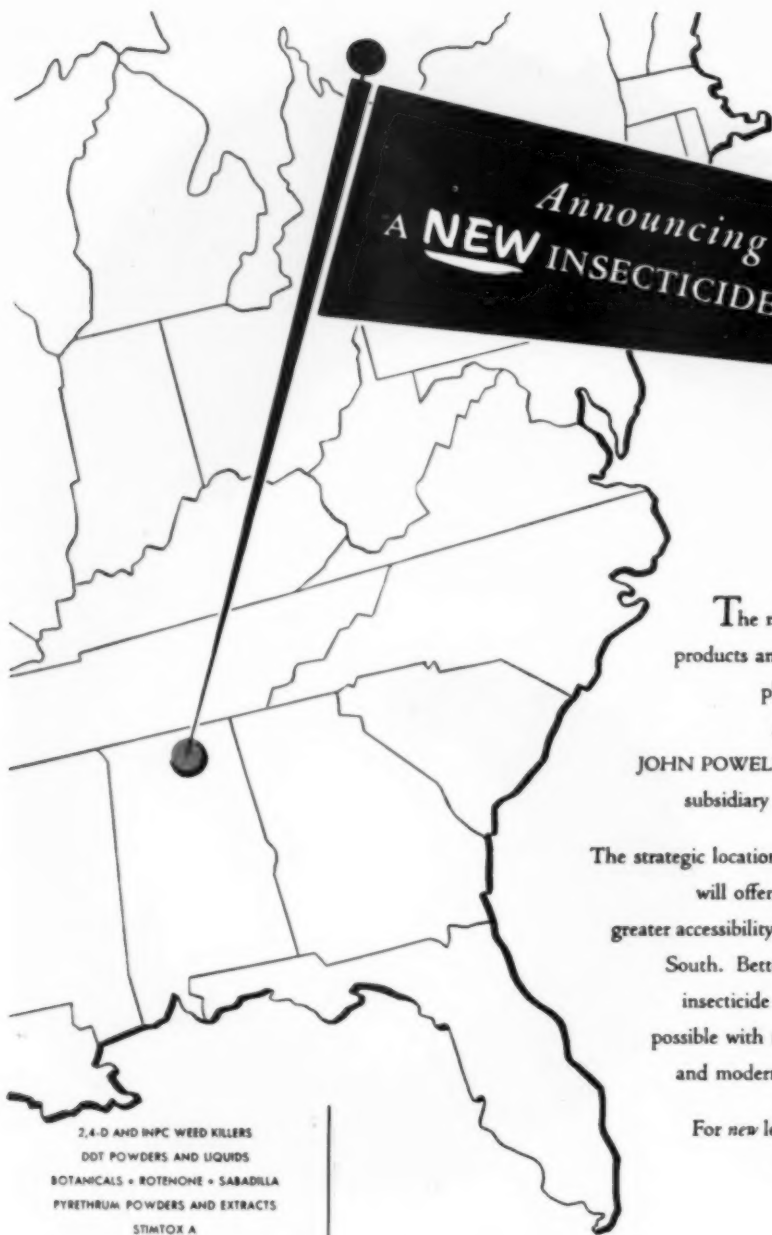
Early season reports on fruit insect conditions are now starting to come in from some fruit-growing areas.

Eggs of the pear psylla were first observed in eastern New York on March 22. A few eggs of this insect were observed on pear in Washington State on March 21.

Both the apple aphid and the apple grain aphid began to make their appearance in New York orchards toward the end of March. Most of the rosy aphid and apple aphid eggs were assumed to have hatched in southern New Jersey by the end of that month. Hatching of the apple grain aphid began in the Vincennes area of Indiana on March 26. Aphid eggs are said to be less abundant there than last year. Aphids on apple were reported as light in early April in most southern Illinois orchards. Most of the overwintered eggs of the green peach aphid had hatched by March 11 in the lower Yakima Valley of Washington and these aphids appeared numerous there.

Mortality of overwintering two-spotted spider mites was reported to be less than in previous years in eastern New York orchards, although the majority of the hibernating forms again died out. Overwintering eggs of the European red

(Turn to page 87)



Announcing... A NEW INSECTICIDE CENTER

The makers of POWCO BRAND products announce the opening of new plant facilities at Huntsville, Alabama, to be operated by JOHN POWELL CHEMICAL COMPANY, subsidiary of John Powell & Co., Inc.

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**Recent Pronouncements on DDT
May Have Long-Range Effect on**

FUTURE PESTICIDE MARKETS

by

Melvin Goldberg

Pesticide Advisory Service
37 Wall Street, New York



THE recent announcement of the U. S. Department of Agriculture stating that certain changes are to be made in the labeling of various insecticides containing chlorinated hydrocarbons, marks the climax of a long series of events, many of which have served to complicate both the price and supply picture during the current insecticide season.

As this is being written about the middle of April, it is difficult to predict the effect of these recent events, but it appears safe to assume that production of DDT will continue to decline. Production in the calendar year of 1948 was but one third of 1947's figure, and it is generally conceded that 1949 will see an even smaller output.

The problem of production economics thus becomes particularly important, since it may be impossible to continue producing technical DDT on a smaller scale and maintain the currently quoted market price which is based on full scale production.

Although most industry spokesmen stated that their companies were taking the new developments in stride, there is likely to be a great deal of difficulty and inconvenience throughout the industry because of the switch in labeling and recommendations. The industry had watched with interest the step-by-step development of the DDT situation, but most agree that

a recent series of articles in the daily press provided the spark which precipitated this final phase. A number of industry people expressed themselves by saying that this action should have been taken some time ago.

Cotton Insecticides

A RECENT USDA publication (No. 772) gives early application of cotton insecticides a boost. It is a study which might well be used by the industry in promoting this type of early season application by presenting production figures resulting from early season application. The study indicates further, that large scale community experiments of this kind should be conducted in cotton producing areas during several seasons to determine whether and under what conditions the early season application of insecticides is profitable.

Recommendations for the coming season for cotton insect control have been issued and the industry has substantial quantities of all dusts in anticipation of a heavy demand. Dusting has already started in the Texas area, most of which has been for the control of grasshoppers attacking the cotton crop. It is expected that the price situation for the finished cotton dusts will be about the same as last season.

Weed Killers

D ECEMBER 1948 production of 2,4-D acid according to the Department of Commerce, showed 2,-

257,308 lbs. Total output from September 1948 through December 1948, was 8,433,515 lbs., presumably on the basis of 100% 2,4-D acid.

There was a recent trade announcement of a new compound, the sodium salt of trichloroacetic acid, which may find increasing use in the control of many unwanted grasses which have resisted the actions of other weed killers. The material is said to be effective against such weed pests as the Johnson, Bermuda and quack grasses as well as prickly pear cactus. Advantages of the material were stressed by the trade announcement in that the material is non-combustible, that its period of soil sterility is relatively short and that it can be mixed with 2,4-D and other weed killers.

DDT

PRODUCTION of DDT for the calendar year 1948 according to the Commerce Department reports is 16,446,258 lbs. which compares to a production in the calendar year 1947 of 49,600,000 lbs. Movements of technical DDT have continued spotty with material still being quoted CL for domestic consumers at 32c lb., f.o.b. works with freight equalized with various producing points. Movement in the export field while spotty, has been below this figure.

Benzene Hexachloride

PRODUCTION of benzene hexachloride during 1948 was almost double the amount produced during

1947. Gamma isomer content of 1948 production was also higher than that produced in the previous year. A typical example illustrates the point—December 1947 production averaged 12.7% gamma isomer content while December 1948 production was 15.2 (average). 1947 production of technical benzene hexachloride was 8,197,000 lbs. while 1948 shows a production of 15,764,528 lbs., according to Commerce Department figures.

Movement of technical material is active at this time since all producers are now engaged in filling pipelines with material for use this year.

Metallic Chemicals

PRIOR weakness in the field of lead, zinc and copper metals is having its effect on the price of metallic chemicals made from these materials used in the agricultural pesticide field. As of this writing, there has been no announced decrease in the price of copper but the threat of weakness in price has already been felt.

The price of metallic lead has declined 6½¢ lb. but to date the decline has not shown up in the price of lead arsenate. Industry spokesmen point out that lead arsenate for this season was produced prior to the weakness in the metallic lead price. The price of lead arsenate is having some effect on the amount of material likely to be consumed.

The decline in price of zinc sulphate parallels the drop in the metallic zinc market.

Pyrethrum

DURING the latter part of March, the Industry Sub-Committee of the Army-Navy Munitions Board concerned with the stock-piling of pyrethrum concentrate held a meeting to continue discussions on the specifications of the extract to be so stock-piled. The Government has been stock-piling 20% pyrethrin extract since 1947.

Press dispatches issued from Washington indicate that the plan is to continue stock-piling of the

pyrethrin extract "to protect the nation's insecticide supply." The reason for the continuance of the program according to this dispatch is that "this country is dependent completely on foreign sources of pyrethrum which is necessary to the armed forces in combatting certain insects."

The industry feels that no additional quantities should be

stock-piled at this time until some questions are answered as to what is to be done with materials now in stock-pile and further that a more satisfactory specification is resolved to assure stability of material so stock-piled.

In this connection the recent announcement of the synthesis for the first time, of a pyrethrum-like

(Turn to page 93)

Agricultural Chemicals Survey Reveals POSSIBLE SHORTAGE OF PYRETHRUM

THE current concern with the toxic residue problem on DDT and other chlorinated insecticides, as well as the problems created by the declining effectiveness of DDT in the control of house flies, have combined to focus attention currently on pyrethrum. If the hazards of poisonous insecticide residues must be avoided on truck crops, on forage for cattle, in the dairy barn, etc., does this presage a return to use of pyrethrum, many insecticide manufacturers are asking? If DDT residual sprays are losing some of their former effectiveness in fly control, will there be a return to use of pyrethrum space sprays, which were the standard product for fly control for many years? And if there is a big increase in demand for pyrethrum in the light of recent developments, will the pyrethrum be available?

The need for an immediate answer to these questions sent *Agricultural Chemicals'* reportorial staff out on a series of interviews this past month which disclosed a rather disquieting situation so far as the pyrethrum supply outlook is concerned. Through the war years, and for several years after the end of the war, pyrethrum production in Kenya and the Belgian Congo was kept at peak levels through government guarantees. This resulted in a pyrethrum surplus after the war ended. Demand declined sharply and the pyrethrum market was further depressed by two poor years

for sale of household insecticides in '46 and '47, coupled with the rush by the buying public to products containing DDT. Discouraged by the lack of demand, and the surplus supply, pyrethrum growers promptly cut acreage.

This trend changed in '47, and producers responded by increasing acreage moderately in May, '48, but there is of necessity a considerable lag in bringing supply into adjustment with demand on this crop. Pyrethrum is a two-year crop, and there is a long delay between planting new acreage and the time when the added output reaches the market. Contributing further to the current poor supply situation is the fact that poor yields have been reported from Kenya over the past six months. Besides reducing available supplies, this has had the effect of further discouraging growers, many of whom are reported to feel that they can grow other crops more profitably. The delegation from Kenya that came to the United States last fall asked a higher price for pyrethrum and is reported to have succeeded in boosting the contract figure from about 25½¢ lb. to approximately 30¢ (delivered). Now Kenya producers are reported asking a further substantial increase in price, and it is indicated that if higher prices are not obtainable many growers will shift to other crops that are less trouble to raise and more attractively priced. The

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AGRICULTURAL CHEMICALS

Technical Briefs

Fertilizer & Grapes

Two fertilizer experiments have been conducted in Concord vineyards for 4 years, during which time almost all the vines have been moderately pruned, i.e., 30 buds for the initial pound of prunings and 8 for each additional pound. The response to fertilizer applications has been small. On 200 vines lightly pruned, with 40 buds for the initial pound of prunings and 8 for each additional pound, grape production per vine was 13 pounds where soil was least fertile and nearly 17 pounds per vine where soil was most fertile. On 200 vines more severely pruned the variation in yield between these same gradients in fertility was only one-third as much. This shows a strong relationship between pruning severity and soil fertility which will be used in all our cultural experiments with grapes.—Nelson J. Shaulis, in **Sixty-seventh Annual Report**, New York State Agricultural Experiment Station, Geneva.

Parathion Residue Studied

One pound per 100 gallons of water of the 25 per cent wettable powder of parathion applied to Bing cherries, Moorpark and Tilton apricots, Italian and Hungarian prunes, and Elberta, Golden Jubilee, and J. H. Hale peaches resulted in parathion residue on the surface of the fruit, 30 days or more after harvest, that ranged from 0.00 to 0.08 p.p.m. When the fruit was analyzed less than 30 days after application the parathion residue ranged from 0.08 to 1.63 p.p.m. Jonathan, Delicious and Winesap apples sprayed with varying concentrations (0.5 to 1 pound) of 15 or 25 per cent wettable powder per 100 gallons carried a parathion residue ranging from 0.00 to 0.14 p.p.m. when ana-

lyzed 29 to 104 days after harvest.

Sprays of 1 and 4 pounds of the 25 per cent wettable powder were applied to Delicious apples, under field conditions. The parathion surface residue was decreased from 83 to 85 per cent in 12 to 13 days and 96 to 100 per cent in 30 to 32 days. When three cover sprays of 25 per cent wettable powder were applied at varying concentrates (0.5 to 4 pounds) to Delicious apples the parathion surface residue 90 days after the last application ranged from 0.00 to 0.00 p.p.m. — *From paper presented at American Chemical Society meeting, San Francisco, March 27-April 1, by Kenneth C. Walker, Division of Chemistry, Washington Agricultural Experiment Station.*

Red Mite Control on Apples

More efficient control of the European red mite on apples may be obtained by applying oil sprays as near to the hatching period as possible, according to experimental work reported by entomologists at the New York State Agricultural Experiment Station at Geneva, N. Y. In tests carried on under commercial orchard conditions, this meant delaying the application of the oil spray until the green-tip stage, when a 2 per cent "superior" oil gave 97 per cent kill of the eggs. In the 1948 season this application was made six days before the eggs hatched. Comparable results were also obtained with 0.5 per cent concentration of DN-289, one of the new dinitro compounds.

How far this delayed treatment can be carried in safety to the trees and without involving complications with sulfur fungicides remains to be determined. With the new "superior" type oils which have been developed by the Station scientists, it is safe to delay applications until the delayed dormant stage

when leaves in apple blossom buds are exposed one-fourth to one-half inch. While these oils cost more per gallon than regular type oils, they are highly efficient as egg sprays at lower concentrations and, in addition, are safer to use.

Entomogenous Fungi

"The Culture and Use of Entomogenous Fungi for the Control of Insect Pests" are discussed by Edgar Dresner in the January-March 1949 issue of *Contributions from Boyce Thompson Institute*. The species of fungi tested were: *Metarrhizium glutinosum* Pope, *Empusa americana* Thax., and *Beauveria bassiana* (Bals.) Vuill.

The main limiting factor in the use of artificially spread fungus was found to be atmospheric humidity. The experimental work indicated that entomogenous fungi can be depended upon to control insect pest infestations in the frequent rainfall and high humidity areas of the Atlantic Coast of the United States. Areas outside of this weather pattern should not depend on entomogenous fungi for the control of pest populations. If the exacting requirements for entomogenous fungi are met, an inexpensive, long-lasting control may result.

Cotton Insect Experiments

All the cotton farmers in four communities in Wharton County, Texas, participated in an experimental early-season program for cotton-insect control in 1948. In three communities — Iago, Glen Flora, and Five Corners — located in wooded sections, the most damaging insect was the boll weevil (*Anthonomus grandis* Boh.). In the fourth community — Danevang — located in open prairie country, the cotton fleahopper (*Psallus serriatus* (Reut.)) was most damaging. A total of 111 fields, consisting of 6,214 acres, were dusted. Nearby undusted communities were utilized as checks. A 20-per cent toxaphene dust was used for the boll weevil and a 10 per cent toxaphene dust (Turn to page 85)

Mighty links in a chain of progress

Progress of agricultural chemicals as a means of greater and better production from the soil is a careful process in which many play important roles.

Each link of advancement between the old and the new begins in research laboratories and the development of new chemicals.

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AGRICULTURAL CHEMICALS

Suppliers' Bulletins

"Dowicide G" Pellets

Dow Chemical Co., Midland, Mich., has announced the availability of "Dowicide G", water-soluble medium pentachlorophenolate, in the form of hard pellets to control dust and facilitate handling of the salt during its application to agricultural and industrial products. The cylindrical pellets are compressed to one-fourth the volume of the flake in which shape the material was formerly marketed. The material is used in agriculture for control of mold and bacterial losses.

Bulletin On Emulsol

The Emulsol Corp., Chicago, has just released a new technical bulletin, No. 27, which describes "Emcol H-74," a new high concentrate type emulsified for chlordane and toxaphene. Light-colored and stable concentrates of these two toxicants may be produced with "Emcol H-74" in conjunction with kerosene type solvents, according to the suppliers. Copies of the bulletin are available.

Nopco Product Bulletin

Nopco Chemical Co., Harrison, N. J., has announced a new product, "Nopco 1219-A" for emulsifying or solubilizing chlordane. The product can be used for the preparation of stable chlordane emulsions for agricultural sprays and for producing clear solutions of chlordane in water without solvent for exterminating use. Physical properties and formulating techniques are described in a bulletin, "Nopco 1219-A" which is available by writing directly to the company.

"Cal-Nitro" Literature

Synthetic Nitrogen Products Corp., 285 Madison Ave., New York 17, N. Y. has published

two recent bulletins on its product, "Cal-Nitro" fertilizer compound. One booklet describes the product as a topdresser for small grains and the other as a nutrient for corn, cotton and vegetable crops. Storage information is presented, with the statement that the product is non-combustible and is not explosive under conditions met in practice. Copies of the two booklets are available from the company.

"Nytro," New Spreader

"Nytro," new wetting and suspending agent recently announced as commercially available by the Solvay Process Division of Allied Chemical & Dye Corp., New York, is the subject of a report by the company on its use in agricultural sprays. The report, "Nytro for Agricultural Sprays," covers test applications with DDT and 2,4-D preparations and in sulfur sprays. "Nytro" has advantages, as outlined in the report, in hard water, in acid or alkaline solutions, and in its wide compatibility with a wide range of metallic salts frequently encountered in agricultural products. The report states that "Nytro" improves spreading, aids in preventing clogging of spray nozzles, improves and prolongs suspension of particles. Copies may be obtained direct from the Solvay Sales Division, 40 Rector St., New York 6, N. Y.

Offers Product Booklet

Mathieson Chemical Corp., New York, has recently issued a 32 page booklet covering the history, operations and products of the company. Information is given on methods of production, properties and applications of various chemical products made

by the firm. These include ammonia and various specialties for use in agriculture. Also included is a description of the recently-developed stationary mercury cell for the production of chlorine and caustic soda. The booklet is available from the company, 60 E. 42nd St., New York 17, N. Y.

New S-W Hammer Mill

Sprout-Waldron & Co. has announced the addition of a new model C-G Hammer Mill designed specifically for custom grinding. A descriptive bulletin, CG-948 presents photographs and diagrams of the mill, showing typical installations. The bulletin is available from the company, 7 Waldron St., Muncy, Pennsylvania.

Safety Bulletin Issued

Mine Safety Appliances Co., Pittsburgh, Pa., has issued a bulletin describing its "Chemgard Acid Hood," a protective garment for use in operations where toxic acids or sprays are a hazard, or where protection is needed for the head, neck and chest. The hood is said to be light in weight and resistant to acids, grease, etc. Write for booklet CF-24, Mine Safety Appliances Co., Thomas & Meade Streets, Pittsburgh 8, Pa.

Greenhouse Aerosol Guide

A comparative aerosol guide for use in greenhouses has been published by the insecticide division of Innis, Speiden & Co., 117 Liberty St., New York 6. The two-color chart, 18 by 25 inches in size, is designed for handy reference when hung on the head-house wall.

The "Iscomist Aerosol Guide" gives latest information on how to use all greenhouse aerosol bomb formulations plus a table of recommendations for control of greenhouse insects. In addition, the chart answers ques-

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AGRICULTURAL CHEMICALS

INDUSTRY NEWS

Williams and Ballman to New Positions at Dow



Donald Williams

Dow Chemical Co., Midland, Mich., has announced the appointments of Donald Williams as Director of Sales and of Donald K. Ballman as General Sales Manager. Mr. Williams is a graduate of Pennsylvania State College, and joined the Dow sales staff in 1924 as a member of the Insecticide Division. He was made general sales manager in 1945. He now succeeds Leland I. Doan who was named president of the company following the death of Willard Dow in March.



Donald K. Ballman

Mr. Ballman was graduated from Indiana University in 1929, and joined Dow in 1935 to become a salesman in the insecticide department, specializing in the development and sales of fungicides and wood preservatives. He was appointed assistant general sales manager in 1945. In his new position, he will succeed Mr. Williams.

Dr. L. S. Roehm, formerly manager of technical service and development was named the successor to Mr. Ballman.

Canada to Fight 'Hoppers

The Canadian Government plans to launch a large-scale grasshopper control program during the summer months, it has been announced. The Provinces of Alberta, Manitoba and Saskatchewan, all major agricultural producing areas, will see the largest scale pest control program ever attempted.

Material recommended for use for this program is chlordane, to be applied as a spray at the rate of three-fourths pound of actual chemical to the acre. It will also be used in bait at the rate of one-half pound to 100 pounds of sawdust, bran or powder.

Pacific Slope Program Listed

Program plans for the 33rd annual meeting of the Pacific Slope Branch of the American Association of Economic Entomologists were not completed at press time, but some of the topics to be discussed were announced. The meeting, to be held at Bright Angel Lodge, Grand Canyon, Arizona, June 16-18, will include discussions of the mode of action of new insecticides; synergists for insecticides; insect resistance to DDT and other insecticides; new equipment for insecticide application; biological control and insect pathology. The annual banquet will be held on the evening of June 17.

Reservations were being made through M. F. Wharton, P. O. Box 2828, Phoenix, Ariz., according to a bulletin sent out by Roy E. Campbell, U.S.D.A., Alhambra, Calif., secretary of the Pacific Slope Branch.

Discuss Western Rail Rates

That further increases in railroad freight rates would retard development of the phosphate fertilizer industry in the west, was pointed out at a hearing of the Interstate Commerce Commission at Salt Lake City, Utah, in April.

D. H. Mater, Portland, Oregon, representative of the U. S. Department of the Interior, stated that there are "fantastic possibilities" in development of a western fertilizer industry, stating that about 60 per cent of the nation's phosphate rock resources lies in the northwest, but that only about 5 per cent of the nation's total output comes from that section. He declared that the West's situation was particularly vulnerable to freight rate increases, because transportation costs make up a large percentage of the final selling cost of such commodities.

MEETINGS

National Agricultural Chemicals Association (AIFA). Annual Spring meeting. Westchester Biltmore Hotel, Rye, N. Y., May 5-6, 1949.

Pacific Slope Branch, A.A.E.E. Bright Angel Lodge, Grand Canyon, Ariz., June 16, 17 and 18.

Natl. Assn. of Insecticide & Disinfectant Mfrs., Chicago, June 13-14.

National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 13-15.

American Plant Food Council, Hotel Mt. Washington, Bretton Woods, N. H., June 19-22, 1949.

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Westvaco Advances Williams

William N. Williams has been appointed Assistant to the Executive Vice President of Westvaco Chemical Division of Food Machinery and Chemical Corporation, New York, the company has



W. N. Williams

announced. Previously head of the Production Department, Mr. Williams will now be concerned with general administration of all departments. He will continue as Vice President of Westvaco Chemical Division.

Aerosols for Grasshoppers

Todd Shipyards Corp., Elmhurst, L. I., recently distributed a news letter dealing with the strong warnings that have been issued by the U. S. Department of Agriculture that the United States is in for a large-scale grasshopper invasion this season. Every state west of the Mississippi is likely to be affected, according to the U.S.D.A. report, as well as Illinois and Michigan, and a particularly heavy infestation is anticipated in a 2,000 mile belt starting in Canada and working down through Montana, Wyoming, Colorado and Texas.

Over the course of the past year or two, sprays and dusts of BHC, chlordane and toxaphene have superseded the former standard treatment of highly toxic bran baits, but the sprays and dusts have introduced the compensating hazard of poisoning forage grass and making it unsafe for feeding to live-

stock. The Todd company now reports that recent experiments indicate this toxicity hazard may be minimized by application of these new toxicants in aerosol form. The danger of tainting forage and feed is thus reduced to a minimum. Aerosol application is also, they report, swifter and cheaper, while just as effective as use of sprays and dusts.

Nordberg Appoints J. Bond

Nordberg Mfg. Co., Milwaukee, Wisconsin, has announced the appointment of Jack B. Bond as District Manager of the Central Territory for the Crusher and Process Machinery Division. His headquarters will be in Milwaukee.

Thompson 20 Yrs. with Wilson

Bayard T. Thompson recently had a joint celebration of his seventieth birthday and his twentieth year with Andrew Wilson, Inc., Springfield, N. J., agricultural chemicals manufacturer. Mr. Thompson has been directly responsible for most of the recent new developments in the line of Wilson products, including their new fungicide, "Anti-Damp." He is currently engaged in giving a series of twenty weekly pest control clinics for the home gardener in the metropolitan area.

Phelps Dodge Elects Brown

Phelps Dodge Copper Products Corp., New York, has elected Wylie Brown chairman of the Board of Directors. Whipple Jacobs is the new president of the corporation.

TCA in Production Now

E. I. duPont de Nemours & Co., Inc., Wilmington, Del., has announced production of its herbicide, "TCA," also known as "Du Pont 60 per cent Sodium TCA Weed Killer." The material, as has been reported previously, is said to be effective against Johnson, Bermuda and quack grasses and prickly pear cactus. It is expected by its makers to prove valuable to indus-

tries, railroads, governmental agencies and ranchers as well as agriculturalists.

Apple Leaves Illinois Survey

James W. Apple, associate entomologist, who has been with



J. W. Apple

the Illinois Natural History Survey for the past seven years, left April 1 to become an associate professor of economic entomology at the University of Wisconsin, Madison. His new position will be in the field of research on canning-crop insects, particularly those affecting peas and corn.

Dr. Wolf Opens Own Business

Dr. Benjamin Wolf has announced the establishment of his own agricultural laboratories located on R. D. No. 4, Bridgeton, N. J. Dr. Wolf has been associated with Seabrook Farms Co. and the G.L.F.-Seabrook Farm Raw Products Research Division for the past several years. The new enterprise opened May 1, is known as Dr. Wolf's Agricultural Laboratories. Dr. Wolf states that it will be devoted to rapid soil and plant analysis and field evaluation of herbicides and other agricultural chemicals.

Pa. Weed Conference in June

Pennsylvania State College has announced that its second annual Weed Field Day will be held on Tuesday, June 14, at State College, Pa. The program had not been announced as this issue closed.

DEPENDABLE COMPOSITIONS

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GEIGY D-30

For use in preparing insecticides for control of a variety of agricultural and household pests.

GY-BEN (BENZENE HEXACHLORIDE)

A solution containing 30% Geigy DDT (by weight) for dilution with liquids, to control flies, mosquitoes, gnats, bedbugs, cockroaches and fleas.

GEIGY PARATHION

Benzene hexachloride formulations containing 25% and 6% gamma isomer.

GESAROL® VD-50

For use in the preparation of dusts and sprays for a diversified list of insects on fruits and vegetables.

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A finely-ground powder containing 50% Geigy DDT. For general agricultural use after addition of diluents to formulate DDT dusts.

GEIGY PURIFIED DDT

A dust base containing 40% chlorinated camphene primarily for use in preparing dusts for cotton-pest control.

METHOXYCHLOR 50%

For use in the preparation of special DDT dusts or sprays for use on tomatoes and cucurbits.

GY-COP "53" (INSOLUBLE COPPER)

For use in the preparation of either sprays or dusts for agriculture, including sprays for the control of flies on livestock and in buildings.

A chemically stable insoluble basic copper sulphate containing 53% metallic copper for use in preparing sprays or dusts.

You can specify any of these dependable Geigy products with full confidence that they will do their part in justifying the claims you make for your insecticides and fungicides. Your inquiries are invited.



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Spray-Resistant Aircraft Finish

Development of an aircraft finish which will resist the chemical action of certain insecticides used in agricultural spraying operations has been announced by Monsanto Chemical Co., St. Louis. Application of "Skylac," Monsanto's line of aircraft coatings, to fabric surfaces of helicopters and other aircraft used in crop spraying and dusting has already been approved by one large commercial aircraft manufacturer, Bell Aircraft Corporation, who recommended to commercial operators of Bell helicopters that "Skylac" be applied in refinishing exterior surfaces.

Conventional types of finishes have been known to peel off spraying and dusting aircraft in as short a time as two hours under conditions where certain chemical insecticides were used, a Monsanto representative stated, and it was to eliminate such complications during agricultural spraying operations that "Skylac" was developed.

New Hudson Power Sprayers

H. D. Hudson Mfg. Co., Chicago, has just announced a new addition to its sprayer line, the "Hudson Peerless Power Spraying Combination." The combination includes a skid-mounted power sprayer, which can be mounted on truck, trailer, tractor or jeep and fitted with either spray boom or spray gun, a multi-boom spray unit which is claimed to be "whip-free," and a trailer with adjustable wheels to straddle row patterns of various widths.

Cooperative Elects

Farm Bureau Chemical Cooperative, Inc., Cincinnati, O., has elected Wayne Shidaker, Columbus, O., as president; Marvin Briggs, Indianapolis, Ind., vice president, Arthur Mullins, Indianapolis, secretary, and K. N. Probasco, Columbus, treasurer. Shidaker was formerly assistant to the general manager of the Ohio Farm Bureau Cooperative Association. He succeeds John

W. Sims, who is executive vice president of the Ohio co-op.

Good Introduces New Spray

James Good Co., Philadelphia, has introduced "Good's AA Insect Spray" compounded especially for use in dairies, barns, and around foodstuffs. The company, founded in 1868, was a pioneer of fish oil soap and spray oils, and has recently been assigned a territory for J. T. Baker's 2,4-D products.

Westvaco Plans Second Unit

Westvaco Chemical Division of Food Machinery & Chemical Corp. has announced that it will install a second electrical phosphorus furnace at its plant at Pocatello, Idaho. Facilities for converting phosphorus from the second unit to soluble phosphates are being provided through an expansion of the Division's Carteret, N. J., phosphate plant and through the erection of a new phosphate plant on the Pacific Coast.

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For insecticides and fungicides of top quality buy only those with EMTCO 23 or 42 as the carrier.

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FLOWABILITY—EMTCO does not cake and even after months of storage flows like water.

SOFTNESS—EMTCO has soft flaky particles which not only reduce abrasion but enhance sticking qualities.

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MASS-PRODUCED TO SAVE YOU MONEY. Easily assembled from standard 10' sections economically produced by assembly line methods. No costly custom-built installation required. Ruggedly built of high tensile alloy steel.

CUSTOMIZED—designed for the job. These Baughman products are specially built for commercial fertilizer operations.



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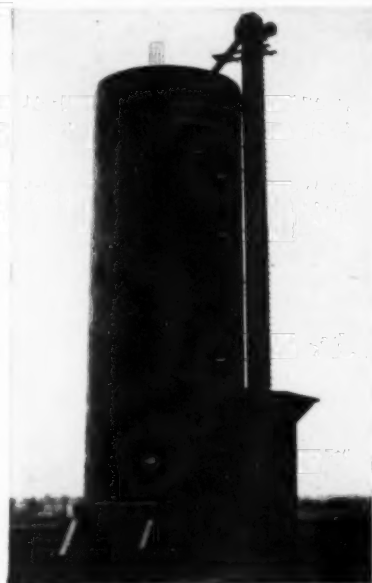


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Load and unload cars and trucks quickly and efficiently. Large capacity 9" conveyor screw easily handles dry powdered lime, phosphate, commercial fertilizers—up to 40 bushels per minute. Top performance from the horizontal to 50°. Available with or without wheels. Ruggedly built of high tensile alloy steel. Direct line shaft drive. Gasoline or electric power.

Fertilizer News

API Appoints Dr. Reed

The American Potash Institute has announced the appointment of Dr. J. Fielding Reed as manager of its southern territory, a position left vacant by the election of Dr. H. B. Mann as president of the Institute. Dr. Reed is to take over his new assignment on July 1. Dr. Reed is a graduate of Louisiana State University, and received his Ph.D. there in 1937. He held a Rockefeller Foundation fellowship at Cornell University in 1939-40 and then returned to L. S. U. where he served as Assistant Agronomist and Professor of Soils until 1942. He was Agronomist with the North Carolina Department of Agriculture from then until July, 1948, when he was named Director of the Soil-testing Division of the North Carolina Department of Agriculture and Professor of Agronomy at N. C. State College.

Fertilizer Plant Gets Quota

Columbia Metals Corp., Salem, Oregon, has been authorized by the U. S. Department of Commerce to continue to draw on un-

used portions of a quota of Army-produced anhydrous ammonia which had been allocated to the company for use during the fourth quarter of 1948.

The situation came about as an indirect result of the longshoreman's strike which created a shortage of storage space which in turn forced the plant to close. The plant consequently failed to use its full quota, and the Office of Domestic Commerce ruled that because of this, the company had forfeited its right to receive 51 carloads of anhydrous ammonia which it could not handle during the last three months of 1948.

The appeals board, in granting the Columbia Corp. petition, stated that since the demand for nitrogenous fertilizers was far in excess of supply in the northwest, and that the shutdown of the Salem plant was involuntary and beyond the company's control, that the appeal should be granted.

Asks New TVA Projects

A request that the government extend its own manufacture of fertilizers, through construction of

new river control projects in the Missouri and Columbia Valleys, was addressed to the House Agriculture Committee last month by Benton J. Stong, legislative representative of the National Farmers' Union. Mr. Stong charged that commercial fertilizer manufacturers have been forcing farmers to use inferior fertilizers by refusing to make and supply high test fertilizers.

The Farmers Union proposes that a transmission line be built from Bonneville to the phosphate beds in southeast Idaho for the development of an electrical furnace to produce phosphate for fertilizer. Mr. Stong said he had no suggestions for changes in present methods of distribution of government produced fertilizer to minimize government competition with commercial producers.

Naco Plant Described

"Powerfax," quarterly magazine produced by the Elliott Company, Ridgeway, N. J., carries a feature on the new Naco Fertilizer Company's plant at Charleston, S. C. Fully described are the methods of utilizing advanced ideas in housing equipment, mechanical handling, and "assembly line" processing. The plant, it says, has been turning out more than its 100 ton per day rated capacity.



Members of NFA's Board of Directors at the spring meeting at Tampa, Florida: Seated, Moultrie J. Clement, Weller Noble, Maurice H. Lockwood, A. W. Weaver, Walter E. Meeken, E. S. Russell, J. E. Totman, C. T. Prindeville, Russell Coleman, Ray King, D. S. Murph.

and C. D. Shallenberger. Standing, E. A. Geoghegan, H. A. Parker, M. S. Hodgson, H. B. Fultz, Louis Ware, J. H. Owens, A. A. Schultz, L. D. Hand, M. G. Field, C. R. Martin, F. N. Bridgers, John E. Powell, L. Graham Campbell, S. F. Elwood, J. A. Miller, A. W. Higgins, and J. A. Chukka.

WHAT WILL THE

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**Promise of rich abundance?
Or warning of failure?**

In large part that will depend upon the care and skill with which the soil has been replenished and enriched by the right fertilizers. Many of the best of these are compounded with Sunshine State Potash, a product of New Mexico. For potash is not only a soil nutrient, but a crop strengthener as well—helping to resist disease and drought. Through its wise use the farmer may look forward with confidence to continuing abundant yields.



Reg. U. S. Pat. 1977

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MANURE SALTS 20% MIN. K_2O



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Montana Fertilizer Report

Montana Agricultural Experiment Station, Bozeman, has issued Bulletin 400, the commercial fertilizer report for 1948. The booklet is divided into two parts; the fertilizer law of Montana, and the report of the State Chemist, P. C. Gaines.

Mo. Farm Bureau Wants Plant

The Missouri Farm Bureau Federation has proposed a plan to build or lease fertilizer mixing facilities. At a conference at Carrollton, Mo., recently, H. E. Slusher, president of the M.F.B.F., told the group that Missouri farmers want high analysis fertilizer materials which the industry fails to provide. He indicated that one of the most logical means of lowering the cost of plant food to the user, is by the use of high analysis materials because freight and warehousing costs are a considerable factor in the end price. The Missouri project is to be patterned after those of Minnesota, Ohio and Illinois, Mr. Slusher said.

Lion Oil Co. Reports

The annual report of Lion Oil Co., El Dorado, Ark., just issued, shows both sales and earnings to have been at record levels in 1948. Production of anhydrous ammonia again set a record, with an average of 444 tons per day for an annual total of 162,663 tons. A little over one-fourth of this total was used as such, while the balance went into the manufacture of 109,606 tons of nitrogen fertilizer solutions and 125,844 tons of ammonium nitrate fertilizer. A program of further expansion, scheduled for completion during 1949, will increase capacity for production of anhydrous ammonia to 570 tons per day. A sulphuric acid plant and an ammonium sulphate plant are also under construction.

St. Regis Elects Two

St. Regis Paper Company has announced that Arch Carswell and Reginald L. Vayo were elected vice-presidents of the company on

April 8. Mr. Carswell joined the company in 1928, and last year became general sales manager of the company's Multiwall Bag Division.



Arch Carswell

Before that, he had been Pacific Coast manager of the Multiwall division.

Mr. Vayo joined the company in 1945 to be in charge of pulp sales. In his new position, he will direct sales of Kraft paper and board as well as pulp.

Export Responsibility to Army

The Army expects to take over all of the export requirements of the United States during the coming fertilizer year, it was announced at the March 18 hearing of the house fertilizer subcommittee. This development is expected to enable private producers of commercial fertilizers to increase the domestic supply and thus to lessen the over-all shortage.

Col. R. C. Norvell, of the office of the food administrator of the Army, principal witness before the committee, stated that Steps are being taken toward the leasing of the Ohio River ordnance plant to private industry. There was no indication during the hearing, as to when this might be done, although Col. Norvell said that orders had been issued to expedite the leasing of the plant.

Production of nitrogen at

the three army plants for the coming year was estimated at 352,000 tons. The Ohio River plant, the Morgantown plant, the San Jacinto plant and the Cactus plant were included in the estimate. Shipment of nitrogen to Germany will be unnecessary during the new year, Col. Norvell stated, because that country has been able to increase its production of nitrogen. However, exports to Korea, Japan and to the Ryukus are expected to increase.

Col. Norvell told the committee that the Army was in favor of repeal of the Morse amendment (which requires the Army to make available 10 percent of its anhydrous ammonia to private industry) because it has the effect of putting the Army into the business of buying and selling fertilizers.

Feb. Tag Sales at Peak

Sales of fertilizer tax tags reached the highest level in February that has been recorded since March, 1937, according to the latest Tag Sales report issued by the National Fertilizer Association. The number of tags sold was sufficient to cover 1,465,000 short tons of fertilizer, or 13 per cent more than in January, 1949, and 28.5 per cent more than in February, 1948.

Whitney Freeport Chairman

Freeport Sulphur Company has elected John H. Whitney as chairman of its board of directors, it was announced by Langbourne M. Williams, Jr., president. Mr. Whitney has been a director of Freeport since 1930.

Superphosphate Output Drops

Superphosphate production during January, 1949, although higher than during December, 1948, was substantially below that of January, 1948. Reports submitted to The National Fertilizer Association and a summary of reports submitted to the Bureau of the Census covering all United States plants reveal that 839,000 equivalent short tons

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(18 per cent APA basis) were produced during the January, 1949, 2 per cent more than in December, 1948, but 9 per cent less than for January, 1948. Of total production during January, 1949, 737,000 tons or 88 per cent, were normal superphosphate; the remaining 12 per cent was largely in the form of concentrated superphosphate (45 per cent APA basis), wet base goods having accounted for less than 1 per cent of total production.

Quaker Oats Appoints Bryant

The Quaker Oats Company has announced the appointment of Jack H. Bryant, Winder, Georgia, as sales representative in the South-



J. H. Bryant

east for "FurAg," furfural residue used in making fertilizers.

Mr. Bryant will represent the company in Georgia and neighboring states. His headquarters will be the Atlanta sales office of The Quaker Oats Company, which extracts furfural from farm by-products.

A & S "Shur-Close" Valve Bag

Arkell & Smiths, paper bag manufacturers of Canajoharie, N. Y., are marketing the "Shur-Close Valve Bag" which is said to step up filling operations by approximately one bag per minute over the conventional L. C. Sleeve Bag. The new method permits faster flow of materials, the makers say, and also prevents sifting. The

bag has been tested in actual production. The valve is adaptable to multiwall bags of any number of plies, and may be filled on all standard filling machines.

Proposes Arabian Fertilizer

The possibility of producing some 800,000 tons of fertilizer each year from natural gas now burned as waste in the oilfields in Saudi Arabia, is seen by Jordan H. Sto-

ver, United States official of the United Nations Food and Agriculture Organization. Mr. Jordan recently completed a survey of the situation and estimates that an investment of fifty million dollars for a plant near Qatif, Saudi, would provide 250,000 tons of ammonium sulfate "as a start," and would pay dividends of approximately 15% during the first ten years which he says would pay off the initial investment.

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SPRAJET THIOSEAL Check Valve closes when pressure lowers to between 7 and 10 pounds.

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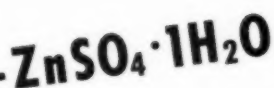
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Vats and other equipment are glass or Monel lined to protect the purity of the products. A new, controlled process assures uniformly high quality.

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AGRICULTURAL CHEMICALS

To Coke Oven Research Post

Coke Oven Ammonia Research Bureau, Inc., Columbus, Ohio, has announced the addition of Murry C. McJunkin to its staff as of April. Mr. McJunkin is now Northeastern agronomist for the Bureau. He is a native of Pennsylvania and a graduate of Pennsylvania State College. Following his graduation in 1940, he taught vocational agriculture in high school, and later, returning to Penn State for advanced study, conducted studies in teaching methods which involved numerous fertilizer demonstrations throughout the State of Pennsylvania.

The Bureau has also announced that Warren C. Huff, formerly agronomist in the northeastern States, has been transferred to the midwest where he will continue his work with the Bureau.

S-W Brush Control Product

The Agricultural Chemicals Division of Sherwin-Williams Co., Cleveland, has announced a new product, "Sher-wilkil," combining 2,4-D and 2,4,5-T for brush control. The product mixes readily with water, the company says, and is effective against poison ivy, poison oak, poison sumac and nearly 60 other types of woody plants which constitute most of the brush to be controlled.

U.S.I. Offers New Dust

U.S. Industrial Chemicals, Inc., New York, has introduced a new dust base said to control a wide range of insects which attack truck crops and vegetables, without leaving toxic residues. The makers report that tests in 15 states over a period of five years, have indicated that insecticides made from the material, known as "CPR Dust Base," give control of both chewing and sucking insects in garden crops, and at

various formulations controlled Mexican bean beetle and the cucumber beetle on snapbeans; the blister beetle on tomatoes and potatoes, and the cabbage looper on cabbages.

The dust base is a combination of piperonyl cyclonene, with pyrethrins and rotenone. It is available to insecticide manufacturers in a uniform blend of the active insecticide ingredients

so that its mixture with diluents and fungicides will present a minimum of difficulties.

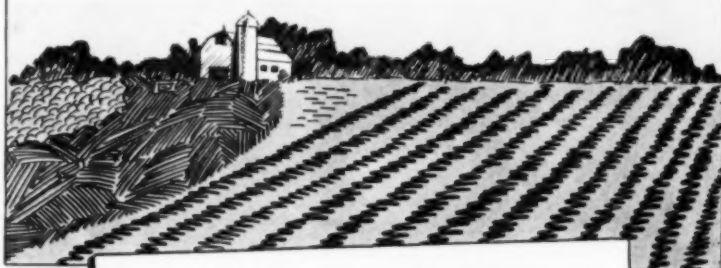
New Cyanamid Department

American Cyanamid Co., New York, has announced the formation of a New Product Development Department to determine possible uses for selected products developed in the company's research laboratories.

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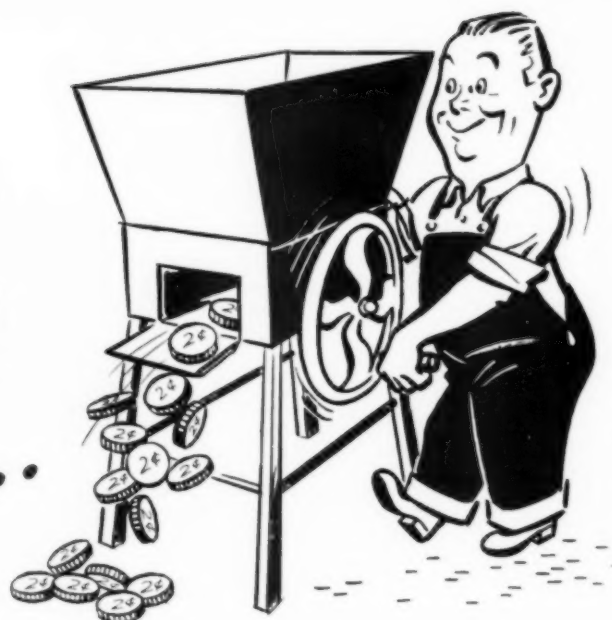
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Reduced grinding costs: Because of Celite's higher liquid absorption properties (more than twice its weight of water), you can grind up to 70% DDT mixtures. High concentrates of BHC and other low melting point poisons may also be ground with Celite.

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TYPICAL CELITE 400 PROPERTIES

Fineness: 8% maximum on 325 mesh
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Bulk: Celite bulks much higher than most diluents
Absorption: 215% of its weight of water
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Composition: Celite is amorphous diatomaceous silica (SiO_2)

For further information about Celite 400 write
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Johns-Manville CELITE 400



Pest Control in Italy

The Italian Government has purchased two American helicopters to be used in Italy for the control of mosquitoes and olive-tree pests. The equipment will be used first in Sardinia where the Rockefeller Foundation has contributed some \$5,000 for the purchase of insecticides to control malarial mosquitoes. The Foundation is also assuming the cost of training a small group of Italian pilots in the U. S. for helicopter operation. The Italian Government has hopes of exterminating olive tree pests through these operations.

Derris, *Lonchocarpus* Compared

Nine chemical characteristics and the toxicity to two species of insects were determined for eight samples of derris and *lonchocarpus* root. When the samples were ranked on the basis of toxicity, rotenone plus natural resins and total chloroform extractives were found to be most nearly in accord with their toxicity to houseflies. The rotenone plus rotenoids ranking was fairly similar to the insecticidal ranking; rotenone content as well as the other chemical characteristics determined showed considerable divergence from the toxicological value.

In general, derris had a higher insecticidal value than *lonchocarpus* when comparisons were based on equal rotenone content. The derris grown in Puerto Rico was much more toxic than that grown in Guatemala, but there was little difference in the *lonchocarpus* samples from Puerto Rico and South America.

The housefly was more satisfactory than the larvae of the Mexican bean beetle as a test insect for evaluation of the relative toxicity of these samples. However, despite the dissimilarity in the manner in which the insecticides were applied, the rankings according to toxicity to the two species agreed when the differences between samples were relatively great.

Merriam A. Jones, formerly

associate chemist, and Caleb Pagan, junior chemist, Puerto Rico (Mayagüez) Federal Experiment Station; Edward R. McGovern, formerly senior entomologist, Wilbur A. Gersdorff, associate chemist, and Price G. Piquett, assistant entomologist, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture, in *Journal of Agricultural Research*, April, 1949.

Builds Safety Laboratory

Mine safety Appliances Co. has announced that it will build a new laboratory in Pittsburgh for the research and development of safety equipment for all industries. The laboratory will be the largest of its kind in the world, the company states. Facilities of the laboratory will be made available to all industry for the investigation of safety equipment problems.

DDT

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TECHNICAL GRADE DDT

50% DDT WETTABLE POWDER

COLLOIDAL DISPERSION 40% DDT

25% DDT EASY EMULSIFIABLE CONCENTRATE

Pioneers in DDT production, the Michigan Chemical Corporation was a prime supplier of technical grade DDT and its formulation to the Armed Forces, UNRRA, Red Cross, and the U. S. Public Health Service during World War II. By tests and actual use Michigan Chemical DDT products have proved unsurpassed for controlling certain insects.

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Pennsylvania Station Reports on Progress

PARATHION in aerosol bombs has given excellent results in trials at the Pennsylvania Experiment Station, State College, Pa., for control of red spider mites, rose leafrollers, aphids, white flies, mealy bugs, roaches, sow bugs, centipedes, Tussock moth larva and numerous other insects in greenhouses, according to Station Reports. Workers did not find the compound objectionable, when using gas masks, nor were the workers affected by residue on plants. Indeed, according to the station's 51st annual report, issued early in 1949, the workers found parathion no more difficult to handle than cyanide or nicotine gases.

The material needs to be applied only once or twice at long intervals, because of its effectiveness, the report comments. It was tried, without injury, on over 7000 varieties of ornamental plants, in-

cluding 200 varieties of mums, and pompoms, many roses and carnations and other greenhouse crops. But the station does not recommend parathion for use on food crops, however.

DDT and benzene hexachloride dust and sprays can be cultivated into or washed into the soil of greenhouse beds at the base of infested plants to kill symphylids, it was determined by floriculture investigators. While quite toxic to symphylids, the bromine should be used with caution, the report warns, since some plants are injured by this material. Too low a temperature or too much moisture also make the bromine fumigants less effective.

The report declares that DDT in cover sprays on apples "is probably superior to any other material now known for destroying codling moth larvae." But un-

less acaricides are added, red mites multiply and cause severe damage, it was observed. Applications of DDT, phenothiazine-lead arsenate and lead arsenate sprays resulted in 97, 96 and 90 percent clear fruit, respectively.

Of the acaricides used, parathion and "C-726" produced better results than the other mite control materials tested, but "C-726" apparently reduced the effectiveness of DDT and in combination with it caused considerable russetting of fruit.

Parathion proved very toxic to second-brood curculios feeding on peach foliage and results of cage tests indicated that spray deposits remained effective for six to ten days under orchard conditions. Further research is deemed necessary by the Pennsylvanians to evaluate the effectiveness of this material in curculio spray schedules and to secure data on the possible occurrence of residues at harvest.



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Conn. Field Day in Aug.

The annual Field Day of the Connecticut Agricultural Experiment Station, New Haven, will be held on August 24, 1949. Dr. James G. Horsfall, director of the Station, states that the event, open to all interested in agricultural research, will be held at the Station's experimental farm at Mt. Carmel, Conn.

Low-Volume Insecticide

Low-gallonage treatment of cotton for insect control has been introduced by Sherwin-Williams Co., Cleveland, with its new insecticidal product, "Kiltone," a water-mixable concentrate combining toxaphene and DDT. Applied with a newly-developed sprayer, the material is reported to be effective in low-gallonage doses for control of such pests as boll-weevil, bollworm, fleahopper, leafworm, thrips, grasshoppers, army worm, lygus and other plant insects.

The sprayer, known as the "yellow devil," is made for use on tractors, using a pint to a quart of material per acre. Both the insecticide and the application equipment are handled through the Sherwin-Williams sales organization.

Big Production of TCA in '50

Dow Chemical Co., Midland, Mich., has announced plans for production of an "adequate" supply of "Dow Sodium TCA-60%", newly-developed chemical grass killer, for the '50 growing season. W. W. Allen, agricultural chemical sales manager, stated that although the product is now available, the demand indicates a short supply this season.

2,4-D to Enlarge Oranges?

Use of a weak solution of 2,4-D to enable California Valencia oranges to grow larger is a possibility on the coast. For the past five years, the oranges have grown smaller and smaller until growers are becoming concerned about the

trend. Application of 2,4-D in diluted quantities is expected to prevent early drop of fruit and thus allow the fruit to grow longer.

W. L. Snyder Dies in Detroit

William L. Snyder, chief chemist of the Detroit Branch of American Agricultural Chemical Co. for more than four years, died April 10 at his home in Detroit. He was 89 years of age.

New Cal-Spray Toxicant

California Spray-Chemical Corp., Richmond, Calif., has placed on the market a new liquid insecticide, "Isotox Concentrate," containing 20 percent of the pure gamma isomer of hexachlorocyclohexane. It is said to give effective control of numerous agricultural pests and is especially adapted for warehouse and indoor pest control.

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Manufacturers of Agricultural Chemicals of Merit

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Emulsifiers

for use in formulating
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- PURATIZED AGRICULTURAL SPRAY—a fruit, shade tree fungicide.
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- PURATURF CRABGRASS KILLER—a selective herbicide that eliminates crabgrass.
- PURATURF 177—an effective cadmium fungicide for the control of turf diseases.
- PURATURF—an organic mercurial for the control of turf diseases.
- PURATIZED SC
- CALACIDE (slimicides for paper mills.)
- PURATIZED FORMULATIONS—mildewproofing textiles.
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Current Information . . .

Time is the essence of a worthwhile information service. . . . Appreciating this, NAC issues weekly bulletins on insect and blight development to its members. . . . These are made available to the Association through cooperation of agencies of the United States Department of Agriculture.

By means of these reports it is possible for members to estimate the requirements of an area, provide for anticipated chemical needs and effectively route the supplies.

This is but one of many bulletins issued by NAC for the protection and information of its membership. . . . Last year more than 450 timely bulletins of all types were issued.



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Mich. Chemical Co. Elects

Roy N. Wismer has been elected president of Michigan Chemical Corporation, Saint Louis, Michigan, to succeed Col. T. C. Davis, who was named chairman of the board.

Mr. Wismer has had long experience in industrial management, having been with Fisher Body Corporation and several other divisions of General Motors for a number of years.

Other new officers of Michigan Chemical are: R. A. Bondurant, executive vice-president and continuing as general manager; L. D. Simmons, formerly production manager and now vice-president in charge of operations and assistant to the executive vice-president; A. M. Byers, vice-president; Paul W. Blume, secretary, and C. G. Woods, comptroller and treasurer. Mr. Bondurant has been with Michigan Chemical since 1943, formerly as technical director. Mr. Simmons was formerly with the DuPont Company in a supervisory capacity.

Directors of Michigan Chemical are Messrs. Wismer, Davis, Bondurant, R. E. Brownell, J. H. McMullen, Newell Wallace, C. S. Mott, C. E. Wetherald, R. P. Place, Harding Mott and S. E. Knauss.

Parathion Hazards Discussed

Parathion is not as hazardous to humans as was generally indicated by a number of published references in 1948. Previously believed to have a cumulative action which pointed to tissue storage, this is reversed in a statement by Dr. Arnold J. Lehman, Chief of the Division of Pharmacology, Food & Drug Administration, in a letter to Dr. E. J. Cameron of the National Cancer Association.

Dr. Lehman stated: "... newer experimental data have revealed two important facts regarding parathion: (1) Parathion is not stored in the tissues to an appreciable extent. (2) Parathion is rapidly destroyed by the tissues of

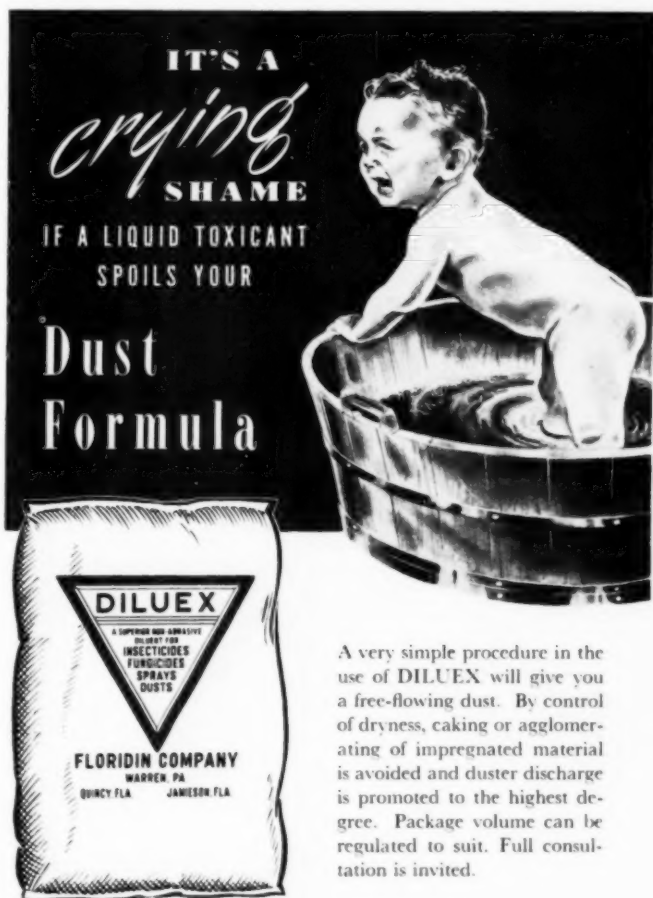
the body which in turn is an added mechanism for the prevention of tissue accumulation. These findings, taken in conjunction with the fact that acceptable directions for use of various concentrations of parathion dusts and sprays include the warning that the last application be made at least 30 days before harvest, lead to our present belief that parathion residues under such conditions would not constitute a health haz-

ard for the consumer. Operators, for their own protection, should strictly observe the detailed directions for caution in the application of the insecticide."

Treichler Texas Gulf V-P

The Texas Gulf Sulphur Co., New York, has elected H. E. Treichler as new vice president of the company.

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A very simple procedure in the use of DILUEX will give you a free-flowing dust. By control of dryness, caking or agglomerating of impregnated material is avoided and duster discharge is promoted to the highest degree. Package volume can be regulated to suit. Full consultation is invited.

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Announces New Product

Dura-Pack, Inc., Glendale, Calif., has announced plans for manufacture and distribution of a new washing ingredient, "Dura-bloom," which, it is claimed, will retard decay in fruits and vegetables while in transit to market. Growers of cauliflower and strawberries, it is said, will be particularly interested, since these farm products are traditionally allergic to water. The

company will also produce another compound, "Sultech," for treating alkaline soils. Distribution on a national scale is planned.

Consolidates Farm Departments

Plant Food Corporation, Los Angeles, Calif., has consolidated its fertilizer and insecticide departments, the company has announced. W. R. Wood has been made vice president in charge of sales, to effect the consolidation.

A new plant is being installed at 3707 Medford St., Los Angeles,



W. R. Wood

to enable customers to pick up split loads of fertilizer and insecticides. The addition of this plant gives Plant Food Corp. a total of four manufacturing units.

Recommends Rotenone

Until the present hysteria regarding the toxicity of DDT and other chlorinated insecticides dies down, the use of materials which present no residue problem, such as rotenone, sabadilla dust, and pyrethrum dust on food crops is recommended by Friar Thompson, manager of the Insecticide Division of R. J. Prentiss & Co., New York. In a letter to the trade, he stated in part:

"The present 'battle of words' over the toxicity of DDT and other organic synthetic insecticides can result in damage in the coming season to many farmers and many insecticide manufacturers. The recent hysterical articles in various newspapers will undoubtedly lead many municipal, county and state health authorities to place stringent regulations on food that contains traces of DDT or that has been exposed to DDT.

Until definite tolerances for DDT residues have been set, insecticide manufacturers would be wise to call to the attention of truck crop growers that wherever applicable only rotenone dusts should be used on food crops such as broccoli, asparagus, cabbage, beans, peas, cauliflower, etc. The press indicates that the cost of rotenone dust is prohibitive. However, rotenone is not expensive when safety factors and versatility are considered. Cube powder analyzing from 4 to 6 per cent rotenone is currently priced at 30¢ per lb. basis 5% pure rotenone, f.o.b. New York."

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TYPICAL WETTABLE CONCENTRATE FORMULA

	% by weight
DDT	50
CONTINENTAL Clay	46 to 48
DARVAN (dispersing agent)	1 to 2
Wetting Agent	1 to 2

CONTINENTAL CLAY

(Recommended Carrier)

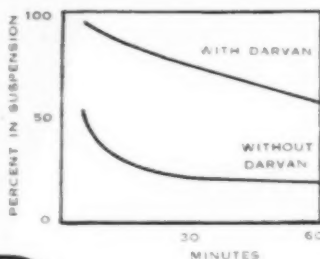
Continental Clay is recommended as a carrier because of its: unusual wettability, flowability, dispersability, compatibility, fine particle size.

Continental Clay, widely used in dry dusts, and now recommended for wettable concentrates, is always in plentiful supply.

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We strongly recommend that a dispersing agent, as well as a wetting agent, be included in this type of formulation to insure good suspension and fine dispersion in the spray tank.



*All recommendations are developed and tested through extensive research at our Norwalk, Conn. laboratories.

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Airplane Operators Discuss Need for More Education at Kansas City Meeting

THAT more information must in "some way" filter down to the operators of airplane spraying and dusting services, was emphasized at the first annual National Agricultural Aviation Conference held at the Kansas City Municipal Auditorium April 21 and 22.

The increasingly important role of the airplane in the application of agricultural chemicals was discussed by a number of speakers, including Charles Rose, president of the National Flying Farmers Association. Dr. E. W. Lehmann, head of the Agricultural Engineering Department of the University of Illinois, Urbana, discussed the means of making the airplane a more effective agricultural implement. He pointed out the numerous chores which the agricultural airplane may handle, but stated that the technique of proper application of agricultural chemicals from the air has lagged considerably behind the development of knowledge of the properties of chemicals themselves. He emphasized the need for a great deal more research in aerial cropping, and cited a number of U.S.D.A. research projects which are now under way. There are many specific problems which must be investigated, he added.

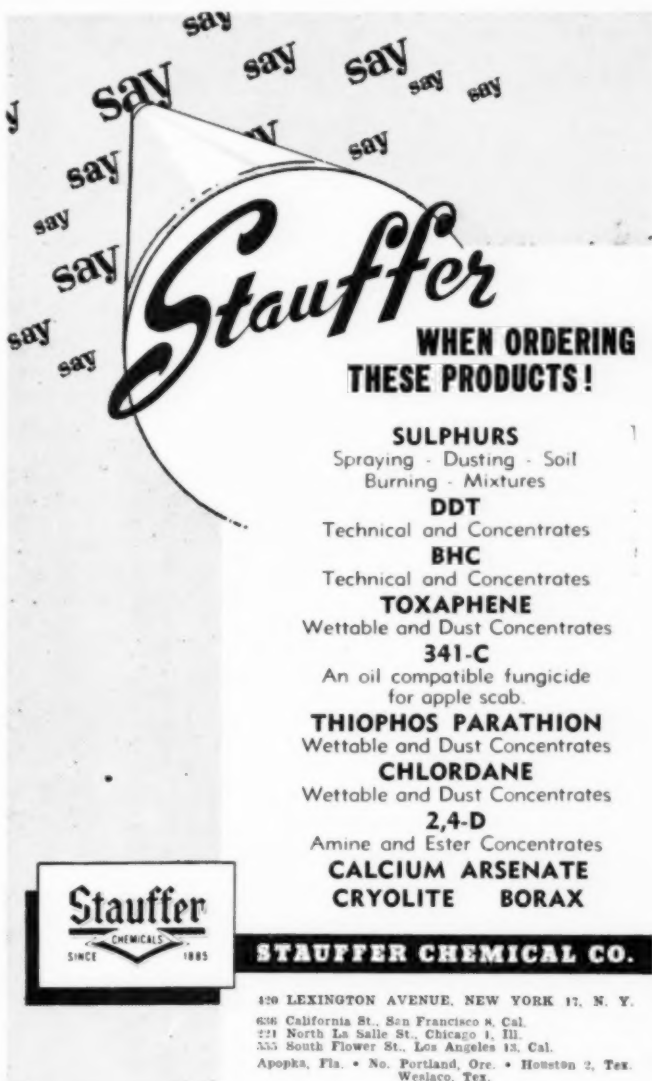
Dr. F. C. Bishopp, assistant chief, Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture, Washington, D.C., told the group that air application is now considered a necessity in certain pest control operations. He pointed out a number of instances where aerial application is accepted practice, and stated that some 3,210 airplanes are devoted to pest control activity in the United States. The many factors involved in safe and proper application of insecticides were discussed, and Dr.

Bishopp reminded that the U.S. Department of Agriculture is conducting research work on aerial application to provide answers to these questions.

D. W. Rentzel, Civil Aeronautics Authority Administrator reviewed the pest control problems for which aircraft applica-

tion is most adaptable, and pointed out the new fields of weed control and control of grasshoppers as ideal fields. Application by air of insecticides for control of cotton pests and forest insects was also cited as being logical.

Mr. Rentzel stated that the C.A.A. prefers education to regulation in guiding the activities of aircraft operators. He said that the aircraft application industry should practice self-regulation



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BHC
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TOXAPHENE
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An oil compatible fungicide
for apple scab.

THIOPHOS PARATHION
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through the establishment of high ethical standards, and should operate only with proper information. Such knowledge should be based on the advice of experts in each particular type of application.

Francis McKay, Safeway Dusting Co., Decatur, Ill., in discussing the role of the airplane operator in agriculture, said that there is a distinct need for an organization of aircraft carriers, and for proper education to enable the operator to fulfill his role of service to the farmer without having to work under legislative restrictions.

The afternoon session was divided into five groups, meeting concurrently. These covered the topics of agriculture research; agriculture and aeronautical engineering; flying farmers; regulation and legislation; and custom operators.

The panel on agriculture research consisted on Dr. L. S. Ellis, dean and director of the

University of Arkansas College of Agriculture; Dr. K. Starr Chester, Supervisor, Agriculture Division, Battelle Memorial Institute, Columbus, Ohio; and Harley Daniels, Superintendent, Red Plains Experiment Station, Guthrie, Okla.

Frank Irons, Agricultural Engineer, U.S.D.A., Toledo, Ohio, was chairman of the group discussing agriculture and aeronautical engineering. Others of the committee were Dr. Fred E. Weick, Director, Personal Aircraft Research Center, Texas A & M College, and E. W. Schroeder, head, Agricultural Engineering Dept., Oklahoma A & M.

The group on flying farmers was under the chairmanship of E. O. Moore, Dexter, New Mexico. Others of the committee included Dudley Miller, Glen Allen, Miss.; and Guy Riggins, Harlem, Mont.

The regulation and legislation discussions were headed by W. H. Berry, C.A.A., Ft. Worth,

Texas. Others of his committee included Asa Roundtree, Jr., State Director of Aeronautics, Montgomery, Ala.; Roy Freeland, Assistant Secretary, Kansas State Board of Agriculture, Topeka, Kansas; William J. Bain, Director, Colorado State Aeronautics Commission, Denver; and Edward Gerbacz, Regional Vice-President, N.A.T.A., Arkansas.

George Houston, Zigler Flying Service, Jennings, La., was chairman of the group on custom operators. Serving on his panel were Sam Freeman, New Jersey; Don Pratt, P-T Air Service, Inc., Hayes, Kansas; E. E. Terry, Terry Aircraft Sales & Service, Helena, Arkansas; and Dwight Miller, Agair, Inc., Don Palos, Calif.

Panel reports were made to the general session on Friday morning by chairmen of the five groups which met on Thursday.

The F.F.A. was urged to sponsor a similar conference in 1950.

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RESOLUTIONS

Resolutions adopted by the group included one describing the present form of waiver under which aerial applicators customarily operate as being "detrimental" and in violation of Civil Air Regulations. The Administrator of Civil Aeronautics will be asked to determine whether the present form of waiver can be changed, or if custom sprayers may be permitted to operate under some form of permit rather than the waiver. The present waiver authorizes any agent of the Administrator to cancel the waiver summarily, to which the operators object.

Another resolution empowered the National Aviation Trades Association to formulate a standard code of operating practices and ethics designed to insure that the hazards of this type work be minimized to the greatest possible extent. The organization was also charged with instituting an educational program designed for wide dissemination of the latest scientific developments and techniques in connection with aerial application of agricultural chemicals. The association was further requested to contact the National Agricultural Chemicals Association with the purpose in view of cooperating and coordinating dissemination of information to aerial agricultural operators.

Mumford Appointed V-Pres.

American Potash & Chemical Corp., Los Angeles, Calif., has announced the appointment of Russell W. Mumford as vice president in charge of technical operations. Mr. Mumford began his service with American Potash in 1920 as director of research, and has served successively as assistant plant manager, consulting engineer, vice president, California manager and a director of the company. With his new appointment, he retains the position of consulting engineer. He succeeds Samuel Cottrell, recently resigned.

Barton to Innis, Speiden

Innis, Speiden & Co., New York, has appointed Richard H. Barton to its insecticide sales division. His territory will include parts of Pennsylvania and New Jersey, and the entire states of Delaware, Maryland and Virginia.

Western Tree Conference May 25

The 16th annual Western Shade Tree Conference is to be held at the El Rancho hotel, Sacramento, California, May 25-28. Included on the program is a session

on plant pests and diseases, and their control. Chairman of this portion of the program is Professor Pierre A. Miller, Division of Plant Pathology, University of California, Los Angeles. Speakers scheduled to appear include Laurel Smith, entomologist, Shell Oil Co.; John B. Steinweden, entomologist, California Department of Agriculture; Dr. D. G. Milbrath, chief, bureau of plant pathology, State Department of Agriculture, Sacramento; and

Prof. Howard A. McMinn, department of botany, Mills College, Oakland, Calif.

A session on the chemistry of weed killers, and adaptation by commercial arborists, was also scheduled to be held with Prof. Miller as chairman. Two speakers were listed on the program: Prof. A. S. Crafts, department of botany, University of California, Davis; and Roger F. Sohner, commercial arborist, San Anselmo, Calif.

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Agricultural Chemicals Specialists

The annual banquet is to be held on the evening of Friday, May 28, in the Empire room of Hotel Senator, Sacramento.

Powell Opens Alabama Plant

John Powell & Co., Inc., New York, has opened a new plant at Huntsville, Ala., for production of basic insecticide and weed-killer materials. It will be operated by John Powell Chemical Co., a new

subsidiary, in charge of Benton Wilcoxon. Present facilities in Brooklyn, N. Y., will be maintained to serve the overseas market and to continue botanical operations. The Huntsville plant will serve the south.

2,4-D in FERTILIZER

(Continued from page 41)

Lanceolata). Other weedy species present included sheep sorrel

(*Rumex acetosella*), black medic (*Medicago lupulina*), and white clover (*Trifolium repens*). Individual plots were 2 feet wide and 25 feet long, and a one-foot border was left between plots. The various lots of fertilizer mixtures were assigned at random to individual plots within 5 blocks or replicates. The weighed amount of fertilizer mixture was applied as carefully and evenly as possible to each plot by hand, when the foliage was free of surface moisture.

Clippings were obtained from all plots by use of a small power mower adjusted to cut at a height of 1.5 inches and fitted with a grass catcher. Fresh weights of both grass and weed foliage were obtained after the clippings had been hand-sorted. The plots were kept mowed for a period of approximately 1 month before taking data on clipping weights, which were then taken on a single week's growth of grass and weeds.

Results Obtained

ALL fertilizer-2,4-D mixtures caused severe damage or killing of the sod when tested after 1 month of storage. It happened that this test period fell on July 19, during rather hot dry weather, conditions that are not favorable for applying relatively large amounts of mineral fertilizers to grasses without danger of injury. Possibly because of lack of rainfall or irrigation water to carry the 2,4-D down to the roots, the weeds in all the treated plots tended to recover while the injured grass with more shallow roots did not recover from the burning effects of the fertilizer. The grass foliage in untreated plots became dry and brown during this period but later recovered. Clipping weighings were not made on the series of plots in this test because of the extensive damage to the grass.

In contrast, the fertilizer-2,4-D mixtures, when tested in the fall of the year, after 3 months of storage, and again in the spring



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"Ethyl" technical BHC is manufactured in the heart of the cotton belt at Baton Rouge, Louisiana.

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after 10 months of storage, caused excellent fertilizing effects on the growth of grass, accompanied by almost 100 percent weed control. As is indicated by the percentage of weed clippings found on plots treated with the various mixtures, the 2,4-D was still potent after 10 months of storage.

During the commercial manufacture of mixed fertilizers, the chemical reactions that occur in the curing process are accelerated by high temperature and high free moisture content in the curing pile. In these tests the relatively high moisture content of 7% at mixing time and the heating of the mixture to 60°C. (140°F.) for a period of 2 weeks apparently did not cause a break-down or inactivation of the 2,4-D present in the mixtures. These conditions simulate those which are possible of occurrence during the manufacture and storage of mixed fertilizers under commercial conditions.

The growth of grass on plots treated with fertilizer only was greatly increased in comparison with the unfertilized control plots, but due to the fertilizing effects on the weeds present in these plots the weeds averaged 51.6% content by weight. Plots treated with fertilizer mixtures containing 2,4-D that were stored 10 months, showed but 1.5% or less of weed content, practically all of which consisted of sheep sorrel (*Rumex acetosella*), a weed species often found resistant to 2,4-D.

Conclusions

ON the basis of these experiments it would seem possible to manufacture fertilizer mixtures containing 2,4-D (acid) and store them for periods as long as 10 months without serious loss of selective weed killing potency of the 2,4-D. In these tests fertilizer mixtures containing as much as 7.0% moisture and heated to 60°C. (140°F.) for 2 weeks immediately after preparation, then stored at ordinary temperatures for 10 months, did not cause the 2,4-D to lose its potency.

PYRETHRUM SHORTAGE

(Continued from page 52)

new planting season is just now coming on, and decisions must be made over the course of the next six to eight weeks whether to re-plant present acreage, to add new acreage, or to plow up the land and put in other crops.

Pyrethrum offers a number

of disadvantages as a crop from the grower's point of view. First, it is a two-year crop, with almost no return the first year. Second, it involves a high labor cost, and labor costs show no sign of dropping anywhere round the world.

All of the above adds up, we are told, to an inevitable shortage of pyrethrum this season. There may not be sufficient supplies to meet minimum demand. As against war time peak production of ap-



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(.45-.5 Pyrethrins)
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10¢ lb.

RED SQUILL

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proximately 8,000 tons, African production during the year ending July, 1949, is not expected to reach more than 4,000 tons. Fortunately, however, synergistic combinations of pyrethrum and other materials are available, which serve materially to extend the utility of the limited supplies.

What, we asked also, will be the effect on this situation of the recent announcement by the U.S. D.A. that its staff has worked out a method of making pyrethrum synthetically? To start with, newspaper reports to the contrary, notwithstanding, the products synthesized by the U.S.D.A. chemists are not truly synthetic pyrethrum, but rather may be more accurately described as chemicals closely related to some of the constituents of natural pyrethrum. And even when the research job is completed, we are told, commercial practicability is still not certain. In any case it is a long step from laboratory synthesis to plant production on a commercial basis. The process would have to be worked out, and plants built or converted, all of which might take some time. For the near future, then, no relief can be anticipated in this direction. The only immediate effect of the U.S.D.A., announcement, we are told, is that growers of the natural product may be even less inclined to increase acreage. Two or three years hence an ample supply of synthetic pyrethrum is of course a possibility, but for the current season it looks now as if supplies of the natural product will be completely inadequate.

TECHNICAL BRIEFS

(Continued from page 53)

for the fleahopper. Usually two applications gave seasonal control.

The dusted cotton retained its early squares and began fruiting heavily several weeks earlier than the undusted cotton, and reached full maturity at least 3 weeks earlier.

In the three communities in-

tested by boll weevil, the dusted cotton averaged 74 per cent less punctured squares, 79 per cent more blooms, and 44 per cent more yield than the undusted cotton. The average yield from the 55 dusted fields was 448 pounds of lint cotton per acre and from the 33 undusted fields 310 pounds — a gain of 138 pounds.

In the community infested by cotton fleahopper, the average yield of lint cotton was 340 pounds per acre in the dusted and 230 pounds in the undusted cotton — a gain of 110 pounds, or 48 per cent.

Experiments similar to the ones reported here should be conducted in many cotton-producing areas to determine the insecticide formulations, the number of applications, and the time of application that will give the most profitable returns.

— *Summary of USDA Bulletin E-772, by K. P. Ewing and C. R. Parencia, Jr., March, 1949.*

Illinois 1949 Fly Campaign

A statewide fly-control campaign in Illinois will be conducted again this summer under the sponsorship of the University of Illinois Agriculture Extension Service, the Illinois Agricultural Association, the State Natural History Survey and the Illinois Public Health Service. H. B. Petty, insect specialist, Illinois College of Agriculture and State Natural History Survey, advises that nine district meetings were held during the first two weeks in April to get the 1949 campaign started.

In last year's campaign, 100,000 farmers sprayed for fly control. Cost was \$1,226,000 and it was estimated that farmers gained almost \$6,000,000 in extra income in increased milk and meat production.

1949 Cotton Recommendations

National Cotton Council of America has just released copies of a booklet which summarizes state control recommendations for cotton pests. The booklet also pic-

tures the four major cotton insect pests, Boll Weevil, Bollworm, Aphid and Leafworm, and adds a brief discussion of the common control materials such as BHC, toxaphene, calcium arsenate, DDT, sulphur, nicotine, chlordane, etc. Copies of the booklet are available from the council, P. O. Box 18, Memphis.

DEALERS

(Continued from page 28)

a large number are undergoing trials at present. The rapid advances in recent years have given us many new and potent weapons to fight our enemies, the injurious insects. The field of battle is constantly shifting, however, and it is impossible to anticipate what developments may occur in as short a time as a few months.

Compatibility of Insecticides

It is frequently in the interest of economy to apply several pest control materials in one spray or dust, rather than make separate applications. Certain insecticides (and fungicides) are commonly compatible. The chart accompanying this article shows which of the common spray materials may be combined safely, and which not. Read the chart as you would a mileage chart on a road map; for example, lead arsenate and lime are compatible (OK) while rotenone and lime are not (NO). A number of combinations may be used under certain conditions, but are not recommended. These are indicated as questionable (Q).

The information given in this article is of necessity of the most elementary and general nature. It is strongly suggested that dealers familiarize themselves thoroughly with the publications of the manufacturer whose products he sells. The local county agent will be able to give valuable advice on specific problems. He will also be glad to secure publications from the state agricultural experiment station which will be of tremendous assistance.

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Wettable and Dry Powders
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Mul-si-mo is a thin, amber-colored oily liquid about the same viscosity as Kerosene Oil.

METHOD OF USE

There is nothing complicated about the use of Mul-si-mo. It is just poured into the oil to be treated at the rate of 1/2 to 1%, depending upon the tightness of emulsion desired—then thoroughly stirred—and the process is completed.

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Mul-si-mo, we believe, is the cheapest and most economical Emulsifier on the market for the emulsification of the oils above specified.

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Extensive tests have shown Mul-si-mo to be non-toxic to plants when used at a dilution of 1 to 100. (Plants used in tests: Cereals.) As summer oils are usually used at the dilution of half gal. to 100 gals. water, at such dilution the rate of Mul-si-mo to water would be 1 to 20,000.

COST OF MUL-SI-MO

Per Gallon \$4.00; 5 Gallons and up at \$3.75 per Gallon; 50 Gallon Drums at \$3.50 per Gallon, f.o.b. New York or Jersey City. (Above prices for U. S. only. Foreign prices on request.)

MUL-SI-MO SAMPLES

A 4 Oz. Sample will be sent upon request.

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To Head Sinclair Sales

Charles F. McGoughran has been appointed general sales manager in full charge of all sales activities of the Sinclair Refining Co., according to an announcement by P. C. Spencer, president. He was formerly executive assistant to the vice president in charge of marketing. M. F. Braeckel, president of the Richfield Oil Corp., New York, Sinclair subsidiary, has been appointed assistant general sales manager.

INSECT CONDITIONS

(Continued from page 49)

mite were reported to be scarce in all but a few eastern New York orchards and no more than moderately abundant in the heaviest infestations observed. Eggs of this pest are generally more abundant than a year ago in orchards in the Vincennes, Indiana area.

A few egg masses of the red-banded leaf roller were found during the first week of April in a southern New Jersey apple orchard. The overwintering population of that pest appears to be greater than ever before in the Vincennes, Ind., area. The moths began to emerge there on March 24. Conditions have been unusually favorable for egg deposition and eggs were found before the end of March.

Plum curculio adults were emerging from their winter quarters in considerable numbers on the Eastern Shore of Maryland around the first of April. In southern New Jersey, no curculio adults had migrated from hibernation quarters to fruit trees by April 7, but they were expected to do so as soon as high temperatures prevailed for 2 or 3 days. Curculio adults were beginning to appear at the edges of peach orchards early in April in parts of southern Indiana and southern Illinois. At Fort Valley, Georgia, the first plum curculio adults of the season were jarred from wild plum trees on February 14. They were being taken on peach trees later in that month, but had not reached the center of peach orchards by March

21. The mortality of overwintered adults was low in the Fort Valley area.

APFC MEETING

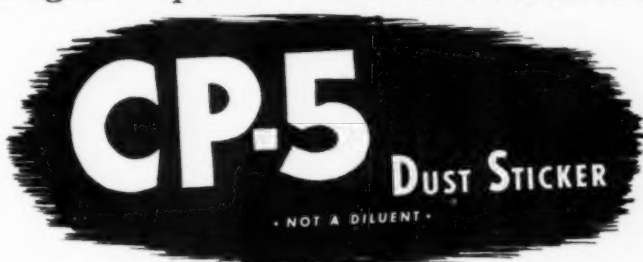
(Continued from page 43)

include a meeting of the new Board, adoption of the annual budget, appointment of the executive committee with an organizational meeting and other new business.

The A.P.F.C. has arranged for a special train to take conven-

tioners to Bretton Woods. It will leave Grand Central terminal, New York, about 9:30 P.M. Saturday, June 18, to arrive in New Hampshire the following morning. The return special train is scheduled to leave Bretton Woods at approximately 8:30 on the evening of Wednesday, June 22. It will arrive in New York the next morning. Arrangements for reservations are being handled through the Council's offices, 817 Barr Building, Washington, D. C.

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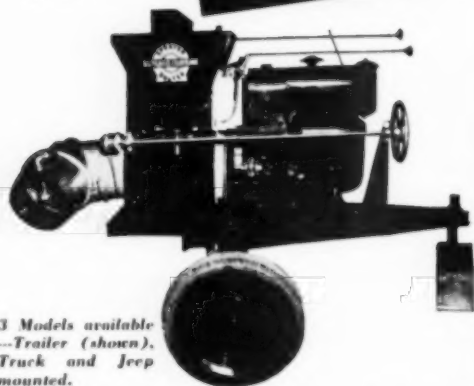
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AGRICULTURAL CHEMICALS

Nematode Division Started

The U.S.D.A. has announced the creation of a Division of Golden Nematode Control within the Bureau of Entomology and Plant Quarantine. Harry L. Smith has been named as leader of the new division. The new appointee is a native of Stamford, Conn., and has been with the U.S.D.A. since 1930.

Spencer Makes Addition

Spencer Chemical Co., Kansas City, Mo., is planning to add production facilities to its Jayhawk Works, Pittsburgh, Kansas, which will increase its output of anhydrous ammonia by an estimated 30,000 to 40,000 tons annually. Engineering work on the project has been completed. Quaker Valley Constructors, Inc., will build the additional facilities, and Chemical Construction Corp., New York, will act as architect engineer on a portion of the project. The plant is expected to be completed in about a year's time.

RYANIA INSECTICIDES

(Continued from page 39)

work the pulverized plant material was used both as a dust and as an aqueous-suspension spray and certain crude extracts were applied in aqueous sprays. Products prepared from *Ryania speciosa* root were found to be effective in one or more of the above forms against the following species:

German cockroach
American cockroach
apple aphid
potato aphid
squash bug
milkweed bug
Japanese beetle
Colorado potato beetle
Mexican bean beetle
asparagus beetle
elm leaf beetle
golden tortoise beetle
yellow mealworm
black carpet beetle
imported cabbage worm
diamondback moth
cabbage looper
corn earworm
silkworm
webbing clothes moth
house fly

None of the various preparations indicated significant ac-

tivity against the following species:

onion thrips
Aedes aegypti larvae
European red mite

In these exploratory tests an unusual pattern of activity was noted. It was found that *Ryania* frequently gave protection against feeding attack without producing a high mortality in the test species even under an observation period of several days. The action appeared to be that of a general depressant, causing relatively rapid cessation of feeding, locomotion, and reproductive activity, but often permitting the insects to remain in a semi-moribund condition for a relatively long period prior to death.

Limited tests have been conducted with ryanodine against certain laboratory species. By the measured-drop test against the German cockroach this alkaloid has shown an approximate L.D.50 dosage of 25 mg./kg. for females and 5 mg./kg. for males. By the same test against the milkweed bug an approximate L.D.50 dosage of 25 mg./kg. for mixed sexes has been established. Deposits of ryanodine on woolen fabrics gave protection against the attack of larvae of the webbing clothes moth and the black carpet beetle at a concentration of 0.0008% on the wool. In contrast with the relatively high activity against some species it was found that a concentration of 10 ppm. was required for an L.D.50 dosage against three-day-old larvae of *Aedes aegypti*.

Physiological Effects

RYANIA extracts and the purified alkaloid, ryanodine, have been studied by various physiologists to determine their site and mode of action.

Edwards et al. (1948) reported that ryanodine injected into roaches caused a flaccid paralysis accompanied by a tremendous increase in oxygen consump-

tion. This effect has also been noted by Hassett (1948). Their work indicates that ryanodine exerts a highly selective action on muscle tissue. Based on results of various physiological tests, Edwards has postulated that ryanodine acts by interfering with the high energy phosphate system in striated muscle. The specificity of ryanodine and its unique mode of action make it of considerable interest to physiologists. For the entomologist these studies offer an explanation of the pattern of activity observed in the insectary tests where a high degree of protection against feeding attack was obtained without producing a high mortality. Insects in the state of "flaccid paralysis" would be incapable of normal activity but could not be classified as dead.

The unique action of *Ryania* insecticides must be recognized for their proper evaluation. The flaccid paralysis mentioned above has led investigators to assume the products to be relatively ineffective on the basis of low mortality counts. Experience has shown that the true effectiveness of *Ryania* insecticides is often demonstrated only in terms of crop or product protection.

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trol Oriental Fruit Moth: Their Effect Upon Parasite Populations. *Jour. Econ. Ent.* 39(2): 211.

PLANT DISEASE

(Continued from page 49)

No late blight was observed on the fall crops of potatoes or tomatoes in West Coast sections. Toward the end of fall, it appeared in tomato seedbeds fields and in spite of warm, dry weather, it caused severe damage in some cases where the grower failed to use recommended control measures.

In the Homestead area late blight was first observed on tomatoes at the end of December, on potatoes about the middle of January. The disease did not become important on either coast, due to weather which was warmer and drier than in other years; and to generally thorough and frequent use of fungicides.

In the Hastings potato area on the northern East Coast, late blight appeared at the middle of February and spread rapidly until the end of the month, when clear windy weather checked it for a while. Growers were somewhat late in applying fungicides and the disease was present in most fields. "Dithane" and "Parzate" sprays and dusts, and copper dusts were being used.

Tobacco blue mold (*Pero-
nospora tabacina*) was found in new seedbeds in Georgia on January 11, the earliest it had ever been observed in a commercial seedbed in the State. This was in an early planted bed, of which there were more than usual in the State this year. Planting beds early almost invariably results in unseasonal, early, and severe blue mold at a time when the disease is much more destructive than later in the season. By the first part of February the disease appeared in scattered beds, mostly early planted, throughout the main part of the Georgia blue-cured area. More than average damage threatened in unprotected beds, but final damage was less than was expected. Temperatures were too high in late January and February.



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CHULA VISTA, CALIF.

In the Gadsden County, Florida, shade tobacco area the disease also appeared earlier than usual, on February 11, but unseasonably warm weather prevented severe damage from the disease.

Activity of blue mold on the wild tobacco, *Nicotiana repanda*, in Texas was reported about the end of February. A single infected bud was found in South Carolina February 26, but no spread has been reported.

In North Carolina blue mold was first noticed March 4 in Columbus County; since then it has been found to be scattered all over the county. In some cases it was causing severe damage, but injury was generally moderate.

Downy mildew (*Pseudoperonospora cubensis*) has been reported from various sections of Florida since the latter part of October. In the Homestead region summer squash is planted throughout the winter season and since downy mildew is more or less a maturity disease on this crop no control is practiced, so that it provides a ready means of carry-over. In various sections around Leesburg the disease had become very serious on cucumbers and was starting to appear on watermelons. Fungicides being used were "Dithane D-14," "Parzate," "Zerlate," and various copper compounds, as well as sulfur.

CHLORDANE in SOIL

(Continued from page 29)

are being continued. Common sense and experience with chlorinated hydrocarbons in general would indicate that chlordane should not be mixed with fertilizers containing appreciable amounts of lime or other alkaline components.

While a great deal remains to be learned in the use of chlordane-fertilizer mixtures for the control of soil pests, a considerable amount of valuable data has been accumulated. Chlordane-fertilizer mixtures will be marketed for certain specific purposes in 1949 and large scale ex-

periments and demonstrations in many areas will be continued.

SUPPLIERS BULLETINS

(Continued from page 57)

tions on safe ventilation time after use, how to control flower thrips, etc.

Write for the "Iscomist Aero-sol Guide" from the company, 117 Liberty St., New York 6.

•

New Pennsalt Product

Pennsylvania Salt Mfg. Co., Philadelphia, has announced the development of a new zero-line calcium arsenate which may be combined successfully with organic insecticides for the control of most cotton-infesting insects. Under the trade name of "Pencal," this material will be available for the current cotton dusting season, the makers state. The product was designed for combination with organic aphicides and miticides such as benzene hexachloride, DDT and parathion without the chemical breakdown of the organic ingredients which occurs when calcium arsenate is used, the company says.

MARKET REPORT

(Continued from page 52)

chemical way aid in the solution of the stock-piling problem. Although commercial production of the synthetic material is two to three years in the future, according to some trade spokesmen, the possibility of such a material can have an important effect on insect control for the future. Due to its apparent lack of toxicity and the eventual economic production, this synthetic material may find a real place in the somewhat cloudy insecticide picture that exists today. However, the Department of Agriculture points out that much still needs to be done before it can be produced in quantities sufficient to appraise its usefulness. It adds further "many things remain to be learned

before it can be said it can be produced commercially."

Meanwhile, the price of pyrethrum-liquid concentrates has increased and the 20-1 concentrate is being quoted by industry from \$7 to \$7.25 per gallon while the 20% pyrethrin extract is being quoted at prices from \$8.50 to \$9. Reports indicate that the material will continue in short supply for at least the balance of 1949.

Rotenone

POWDERED rotenone root containing 5% rotenone content in large quantities continues to be quoted in the 28-30 lb. category. Rotenone industry spokesmen point out that the trend towards botanicals has not yet materialized to the extent that they had hoped, and hence the price increases freely predicted recently, have not yet materialized. There is varying opinion in the industry as to supplies of material on hand at this time, but it is believed that unless there is a more general turning to rotenone for control of insects on peas, which is one of the earliest uses, sufficient supplies are likely to be available.

•

Wingfield Freeport V. P.

E. D. Wingfield has recently been elected vice president of Freeport Sulphur Co. He will be in charge of southern operations with offices in New Orleans.

•

Mathieson Buys New Companies

Mathieson Chemical Corp., New York took over operations of Standard Phosphate & Acid Works, Inc., and Southern Acid & Sulphur Co., Inc., on April 1. All future activities of both offices will be conducted under the name of Mathieson Chemical Corp.

•

Antara Appoints Healey

William H. Healey, formerly associated with Arthur D. Little, Inc., has been appointed supervisor of market research for Antara Products, a division of General Aniline & Film Corp., it has been announced by Harold G. Shelton, General Manager of the division.

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Industry Patents

2,465,061. Fungicidal Composition. Patent issued March 22, 1949, to Oliver W. Cass, Niagara Falls, N. Y., assignor to E. I. duPont de Nemours & Co., Wilmington, Del. A fungicidal composition comprising as a fungicidal agent a compound represented by the formula



in which R is a radical taken from the group consisting of phenyl and chlorinated phenyl and containing, as a carrier, an inert material.

2,465,335. Insecticidal Spray Oil Containing Lecithin. Patent issued March 29, 1949, to Myron J. Burkhard, Ridgewood, N. J., assignor to Socony-Vacuum Oil Co., Inc., New York. A spray oil for use in verdant spraying, comprising a moderately refined petroleum oil of from about 50 to 150 seconds Saybolt viscosity at 100°F., having an unsulphonatable residue not over about 80% and in addition thereto from about 0.05% to about 1.0% by weight of lecithin.

2,465,854. Insecticidal composition containing an aromatic unsaturated carbonyl compound. Patent issued March 29, 1949, to Stephen C. Dorman, Berkeley, and Seaver A. Ballard, Oakland, Calif., assignors to Shell Development Corp., San Francisco. An insecticidal composition comprising a light hydrocarbon oil and, as active insecticidal ingredient, an alkylated benzylidene aliphatic aldehyde.

2,465,855. Arylidene Alicyclic Ketone Insecticide. Patent issued March 29, 1949, to Stephen C. Dorman and Seaver A. Ballard, Oakland, Calif., assignors to Shell Development Co., San Francisco. An insecticidal composition comprising an insecticidal plant extract from the class consisting of pyrethrum and rotenone and a compound having the general structural formula



wherein Ar represents an aryl radical and X is selected from the group consisting of 5 and 6 nuclear carbon atom alicyclic ketonic rings, said rings containing a ketonic oxygen atom on the carbon atom in the ortho position.

Trade Mark Applications

Penphos. in caps and lower case letters, for insecticides. Filed Feb. 13, 1948, by Pennsylvania Salt Mfg. Co., Philadelphia, Pa. Claims use since Nov. 7, 1947.

DiDiT. with the letters "DDT" in capitals, for insecticides to be used on plants and vegetation. Filed Nov. 9, 1945 by Phoenix Chemical Co., Phoenix, Arizona. Claims use since Sept. 20, 1945.

Trivex W-50. in capital letters, for insecticide. Filed Nov. 12, 1947, by Westvaco Chlorine Products Corp., New York, assignor to Food Machinery

and Chemical Corp., New York. Claims use since Oct. 29, 1947.

Sovacide. in stencil capital letters, for hydrocarbon-soluble insecticides, which solvent itself has insecticidal properties. Filed Dec. 24, 1947, by Socony-Vacuum Oil Co., Inc., New York. Claims use since Nov. 5, 1947.

Farm Bureau Quality Products. on red and blue shield, for insecticides and fungicides in the form of sprays and dusting powders. Filed Nov. 19, 1947, by The Farm Bureau Cooperative Association, Inc., Columbus, Ohio. Claims use since Jan. 1, 1942.

Tenlo. in sans serif capital letters, for polyhydroxy alcohol fatty acid ester used as wetting agent and spreader for agricultural chemicals—namely, insecticides, defoliant and weed-killing agents. Filed April 12, 1948, by Griffin Chemical Co., San Francisco. Claims use since May 7, 1947.

70. in bold numerals, for concentrated sulfur paste for use as an insecticide and fungicide. Filed Apr. 26, 1948, by Stauffer Chemical Co., San Francisco. Claims use since Mar. 13, 1940.

112 For Rats. in capital letters, for rat poison. Filed Apr. 27, 1948, by Master Laboratories, Beaver Falls, Pa. Claims use since July 15, 1942.

Kil-Roy-Rat. in capital letters with the first letter of each word in extra large caps, for rat poison. Filed May 7, 1948, by Robert R. Slusser, Terre Haute, Ind. Claims use since Jan. 10, 1947.

Z-C. in heavy capital letters, for fungicides. Filed Jul. 19, 1948, by Food Machinery & Chemical Corp., San Jose, Calif. Claims use since Apr. 24, 1948.

Barrett. in white script letters on solid black circle. For fungicides and insecticides. Filed Jul. 20, 1948, by Allied Chemical & Dye Corp., New York. Claims use since March, 1941.

Dr. Loebel's. in Ultra Bodoni caps and lower case, for liquid insecticide used to kill stored food product insects. Filed Nov. 25, 1947, by Huntington Laboratories, Inc., Huntington, Ind. Claims use since June 15, 1921.

Drawing of globe within circle. for hexaethyl tetraphosphate. Filed July 12, 1947, by Victor Chemical Works, Chicago, Ill. Claims use since June, 1914.

Devex W-50. in capital letters, for insecticide. Filed Oct. 23, 1947, by Westvaco Chlorine Products Corp., assignor to Food Machinery and Chemical Corp., New York. Claims use since Sept. 23, 1947.

"99½" Geaco ("I Grow"). in hand-lettered picture representing horn

of plenty in background, for sulfur used for agricultural purposes. Filed Dec. 8, 1947, by Stauffer Chemical Co., San Francisco. Claims use since Dec. 1, 1935.

Bugmaster. in heavy capital letters, for insecticide. Filed June 3, 1948, by Michigan Chemical Corp., Saint Louis, Mich. Claims use since Nov. 2, 1936.

Fertidine. in sans serif capital letters, for compound containing iodine, for use with fertilizers and as a plant nutrient. Filed Oct. 30, 1947, by Clairmine Chemical Co., Inc., Newark, N. J. Claims use since May 21, 1947.

Tobacco Growers Choice. in hand-lettered capitals on top of hand-drawn tobacco leaf, for commercial fertilizer. Filed July 5, 1947, by Georgia Fertilizer Co., Valdosta, Ga. Claims use since Aug. 13, 1925.

Berkshire. in capital letters slanting upward to the right, for fertilizers. Filed Aug. 5, 1947, by the Davison Chemical Corporation, Baltimore, Md. Claims use since 1886.

Drawing of polar bear. for fertilizer. Filed Aug. 21, 1947, by Armour & Co., Chicago. Claims use since 1918.

Loma Turfod. arranged with the first word above the second, for plant food. Filed Sept. 26, 1947, by Tennessee Corp., New York. Claims use since Feb. 19, 1941.

Farm Bureau Quality Products. on red and blue shield, for fertilizers. Filed Oct. 16, 1947, by The Farm Bureau Cooperative Association, Inc., Columbus, Ohio. Claims use since Jan. 1, 1928.

Japedizer. in capital letters, for lawn food. Filed Apr. 8, 1948, by Associated Seed Growers, Inc., New Haven, Conn. Claims use since March, 1948.

Limoid. in sans serif capital letters, for lime having an agricultural use as a soil conditioner. Filed May 29, 1948, by Warner Co., Philadelphia, Pa.

LETTER TO THE EDITOR

Referring to your article in the March issue (page 42) posing the big question, "What is going to happen to prices of agricultural products" and questioning how this may affect the sale of agricultural insecticides, our own feeling is that the newer agricultural chemicals will be sold as long as farmers continue to plant crops.

I would say, however, that producers of the basic chemicals still have to do a much better job than has been done so far in educating we people who blend and sell their basic products. Thus far our information has all come the hard way.

E. W. Mitchell
Mitchell Seed & Grain Co.
Roswell, N. M.

Classified Advertising

Rates for classified advertisements are ten cents per word, \$2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, \$1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

positions open

Export Manager: Man between 35 and 45 wanted by a leading chemical manufacturer as assistant to the manager of the export department. At least ten years experience in the field and thorough knowledge of industrial and agricultural chemicals and their markets. Knowledge of export fields and languages an asset but not essential. American citizen. Excellent opportunity for important future. Give full record, education, salary and other details in complete confidence. Address Box 348, care of Agricultural Chemicals.

Sales Representation: Jobber with headquarters in Baltimore is in position to give good sales coverage for insecticides, herbicides, and other chemical specialties and equipment throughout the southeastern territory. Prefer exclusive sales arrangement on straight commission basis. Give details to Box No. 352, care of Agricultural Chemicals.

Wanted: We are looking for a competent and qualified manager for our agricultural chemicals blending plant located in the heart of the cotton belt. Applicants should be familiar with all pertinent phases of southern agriculture, and be qualified particularly in the fields of entomology and plant pathology. Send full particulars as to experience and qualifications, salary, ideas, etc., to Box No. 353, care of Agricultural Chemicals.

positions wanted

Chemist: Research and control chemist with leading manufacturer insecticide materials and allied chemicals desires new connection with manufacturer in allied field. Specialized in soils, insecticides, fungicides, emulsions, road building chemicals. Good record. Best references. For further details, write to Box 345, care of Agricultural Chemicals.

Insecticide Production: Young man desires supervisory position in charge

ALVIN J. COX, Ph.D.

Chemical Engineer and Chemist
(Formerly Director of Science,
Government of the Philippine
Islands. Retired Chief, Bureau
of Chemistry, State of California,
Department of Agriculture.)

ADVISOR ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS

Consultant in reference to spray
injury and damage, claims, in-
cluding imports of fruits and
nuts, formulas, labeling, adver-
tising and compliance with law.

1118 Emerson Street
Palo Alto, California

CONSULTING ENTOMOLOGIST

Insecticides — Formulation
Plant Pathology — Research
Entomology — Legal Service

Author of
"Chemistry & Use of Insecticides"

DR. E. R. de ONG

926 Stannage Ave., Albany 6, Calif.

of plant production. Seven years experience in production and packaging of wide variety of insecticides and fungicides. Experience in plant management. Address Box 346 care of Agricultural Chemicals.

Horticulturalist - Entomologist: College graduate. Orchard experience. Desires position with fruit grower or allied industry. Presently employed as entomologist-horticulturalist with large insecticide-fungicide distributor. Knowledge of spray schedules, orchard conditions, insecticides, fungicides, spreaders, stickers, miticides, weed killers, entomology, horticulture, spray machines, pneumatic pruners. Sales experience on both grower and dealer level. Address Box 347 care of Agricultural Chemicals.

Chemist: Ph.D. with many years of experience in fields of insecticides, herbicides, disinfectants, soaps, waxes and other sanitary chemicals, desires position. Address Box 349 care of Agricultural Chemicals.

miscellaneous

Wanted: Used mixers (2) for dry free-flowing powdered products. Must

be clean and in good condition. Capacities 200 lbs. and 1,000 lbs. respectively. State make, type, location, condition, price, and for what purpose previously used. Address Box 350, care of Agricultural Chemicals.

Will Purchase: Weighing and filling machine for packaging granular material in cartons up to five pounds. Used machine of recent manufacture wanted. Give full details. Address Box 351, care of Agricultural Chemicals.

Insecticide Sales: Well known insecticide manufacturer, with established territories, desires permanent arrangement with representatives or organizations now selling jobbers noncompetitive lines in several open territories. Address Box 344, care of Agricultural Chemicals.

Challenges DDT Statements

Recent newspaper articles purporting to expose the menace of DDT to public health, have brought strong rebuttals from numerous sources. Monsanto Chemical Co., St. Louis, Mo., has issued a bulletin quoting statements of the U. S. Department of Agriculture, the Army and Navy, and the Federal Security Agency presenting facts in the matter.

The bulletin, circulated throughout the trade, was produced so that "such damaging and erroneous impressions may be corrected." It called attention to the fact that the newspaper series had attempted to associate the use of DDT with diseases and with milk and meat poisoning.

Packaging Costs Coming Down

The Packaging division of the American Management Association reports that results of a recent survey among 1,400 companies indicated that numerous steps are being considered for lowering production costs and increasing sales through improved packaging, packing and shipping of various products.

Among the steps to be taken were the reduction of loss through damage in shipment; reduction of handling costs through new designs; and more effective use of present automatic machinery for packaging.

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NOW!

EDCO 15

15% PARATHION
WETTABLE
POWDER

Economical, easy-to-use
powder. Effective against a
wider range of insects than
any chemical now in use.
Ideal for packaging.

Sold in Bulk
or Packaged
and Labeled
for you in 3 and
4 lb. Cans

Write today for full
information and prices

EDCO CORP.

ELKTON, MD.



Tricky, but . . .

The old Hindu rope trick is amusing, attracts momentary attention,—but is quickly over and forgotten. Like tricky and spotty advertising! In your mind one minute and gone the next,—in sharp contrast to the proved value of steady regular advertising that bangs away month in and month out,—the proved cumulative value of continuity,—the proved value of keeping your firm and your products constantly before those to whom you sell.

And, if perchance, it happens to be the field of agricultural chemicals which you sell and want to continue to sell, we suggest consideration of regular advertising in

AGRICULTURAL CHEMICALS

254 West 31st Street

New York 1, N. Y.

TALE ENDS

G. ALLEN MAHL, Montana Agricultural Experiment Station, Bozeman, has sent us a bulletin to shed more light on the question of whether or not unusually severe winter weather is effective in killing off over-wintering insects. The past winter, worst in the history of the west, caused many to wonder if the expected grasshopper infestation might be thwarted by the cold.

The bulletin points out that grasshopper eggs or nymphs may pass the winter hibernating under weeds, just under the soil surface or in other sheltered places. The snow acts as an insulation against temperatures which range down to 40 degrees below zero in Montana, he says, and the soil also maintains a higher temperature. As an example, the bulletin presents a chart showing temperatures at various levels. With the air at a temperature of 25 deg. below zero, the soil, under five inches of snow, will be 17 deg. above zero. Grasshopper eggs are from one-half to one inch below soil surface, well out of danger, since the killing temperature for grasshopper eggs is zero. Going downward, the temperature one foot below the soil surface is 24 deg. above zero; 2 feet is 28 deg.; and three feet underground, the temperature is 34 deg. At a depth of 4 feet, a temperature of 37 deg. obtains, and at 5 feet, it is 40 deg.

It would appear, therefore, that there is little comfort for many who may have hoped that nature would take care of grasshoppers for 1949.

"Fertilizer is one of the best buys a farmer can make in 1949," according to Lester Smith, Vermont Extension Service agronomist. He points out that farmers in 1947 spent 580 million dollars for fertilizer materials, while total production expenses amounted to roughly 1,700 million dollars. Thus, out of every dollar spent to produce crops, only three cents were paid out for fertilizer, he says.

AGRICULTURAL CHEMICALS



To meet the demand for dependable 2, 4-D products—

SELL KATHON M-7

another reliable product of Rohm & Haas Company

YOU can offer this dimethylamine salt of 2, 4-D and know you are selling a *dependable* formulation.

YOUR CUSTOMERS will like its convenience. That's because KATHON M-7 is standardized at 4 pounds of 2, 4-D acid equivalent per gallon—a condition that simplifies dosage calculations.

KATHON M-7 is stable, even at low temperatures. And it does not precipitate in hard water.

KATHON M-7 has other advantages. Complete details, prices and samples, if you wish, are yours for the asking.

CHEMICALS



FOR INDUSTRY

**ROHM & HAAS
COMPANY**

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries.

**“Dairy insect control
offers no problems
that cannot be met
Safely and Effectively”**

Pyrenone-type sprays for dairy cattle give better protection, not only against horn flies but also—if properly formulated and used—against stable flies and tabanids as well.

Pyrenone-type emulsions and wettable powders provide residual effect and fly protection in the dairy's milk room and in other dairy, farm, or ranch buildings. And Pyrenones control roaches and many other insects too, including cheese mites.

Pyrenones are recognized as *non-hazardous*. Properly formulated insecticides based on Pyrenones are *equally safe*.

Pyrenones may be formulated as water emulsion concentrates, wettable powders or oil-type sprays.

Contact the nearest U.S.I. office for formulation and labeling data.



INDUSTRIAL CHEMICALS, INC.

60 East 42nd Street, New York 17, N. Y.

*Pyrenone is a registered trademark of U.S.I. It designates combinations of piperonyl butoxide and pyrethrin.

Branches in all principal cities

In Canada: Standard Chemical Co., Ltd., 99 Vanderhaaf Avenue, Leaside, Toronto 17, Ontario